

161

THE
GRAMMARIAN'S
ARITHMETICK:
OR, A
COMPENDIOUS TREATISE
OF THE
ART of CYPHERING,
In all its BRANCHES,
BOTH
VULGAR and DECIMAL.

Adapted to the Capacities of YOUTH in general,
and in particular to the little spare Time of such Young
Gentlemen as in GRAMMAR SCHOOLS are de-
sign'd for the *University*, or *Liberal Professions*.

The RULES to be repeated, and SUMS to be perform'd,
For the Ease of both MASTER and SCHOLAR,
Being printed, and by a peculiar Method render'd much
plainer to be understood, and more expeditiously taught and
learned, than in the Common Way.

IN FOUR PARTS.

By JOHN HOLMES, *Master of the Publick*
GRAMMAR SCHOOL, in Holt, NORFOLK.

At the same Time, while Youth are learning Grammar, some other
Hour of the Day, might be taught them the Rules of Arithme-
tick, and soon after the Elements of Geometry, even playing,
as the old Manner was. MILTON on EDUCATION.

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P R E F A C E.

AS PLATO heretofore wrote over his School, *Let none enter here that's ignorant of GEOMETRY: So ought it ever to be said in all Grammar Schools, Let none depart hence to the University that's ignorant of ARITHMETICK.* For otherwise, how can a Youth be qualified for Lectures in the *Newtonian* Philosophy, Mathematicks, or in short any Part of what is now deem'd the most useful and necessary Knowledge? How many have labour'd, and still labour, for want of it before they went to College, is too too obvious; Nor need I say how far such Gentlemen as I have sent thither have been qualified in *Numbers*, since they're all able to testify for themselves. What is now publish'd is for the Good of such as are to follow them, or are otherwise designed for liberal Professions or Trades.

THE FIRST PART will contain the five Fundamental Rules, *Numeration, Addition, Subtraction, Multiplication, and Division.*

THE SECOND, *Reduction, and The Rule of Three, Direct, Indirect, Double.*

THE THIRD, *Practice, Tare and Trett, Barter, Discount, Interest, Exchange, Fellowship, Alligation, Mensuration, Progression, and False Position.*

THE FOURTH, *Vulgar and Decimal Fractions, with the Extraction of the Square and Cube Roots, and their Application.*

The Printed Sheets are to be bound up with *White Paper*, as much and according as every Master pleases. The Blanks are to be filled up by the Master, that each scholar's Sums may be different. Every printed Question in the Three last Parts may be either wrote over again by the Scholar, or only thus, *The Work of Question 1. Question 2, &c.* Nothing is proposed to be got by Heart but the Rules and Notes printed in the larger Character.

Thus, To shorten the Way to Science, by saving Time and Trouble, since *Man has a great deal to learn, and but a short while to live*, (or, whatever else I can do in my Province for the Advantage of those under my Instruction, be it ever so small) I shall always think my Duty, and worthy of a Man.

J. H.

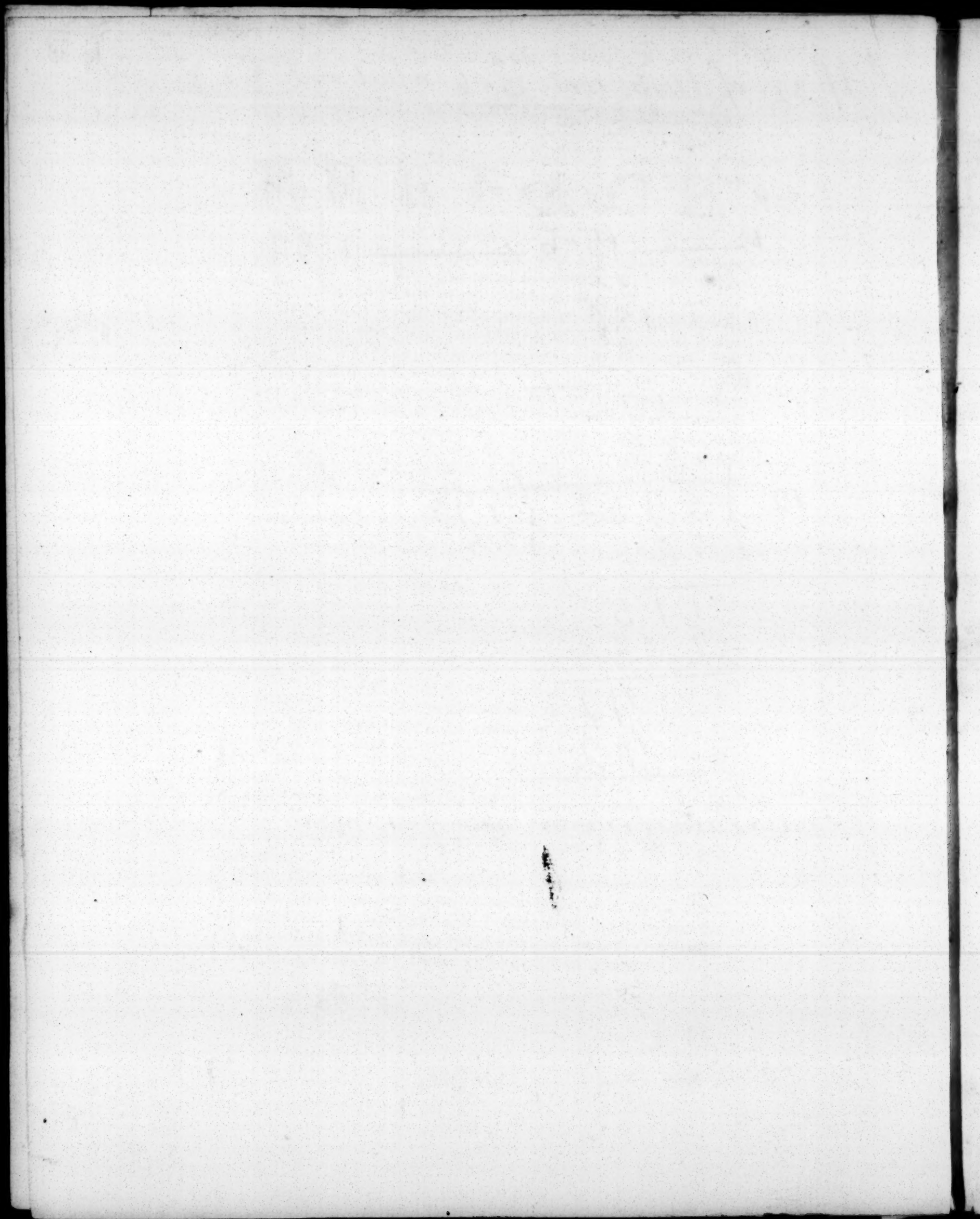


30.4.23

If 32 ^{yd} of Cloth cost 15^s 6^d what will 32 ^{yd} Cost

$$\begin{array}{r}
 \text{yd} \quad \quad \quad \text{s} \quad \text{d} \quad \quad \quad \text{yd} \\
 1 \text{---} 15^s 6^d \text{---} 32 \\
 \underline{12} \\
 186 \\
 32 \\
 \hline
 372 \\
 558 \\
 12 \overline{) 5952} \quad (49/6 \\
 \underline{48} \quad \quad \quad \underline{24} \\
 115 \\
 \underline{108} \\
 72 \\
 \underline{72}
 \end{array}$$

If one Pair of Shoes cost 4^s 6^d what will 12 dozen cost





ARITHMETICK or CYPHERING is *The Art of Num-
bering*. Numbers are express'd by these ten *Figures*,
1, 2, 3, 4, 5, 6, 7, 8, 9, 0. And the whole Art is
comprehended in the various Application of its five fundamental
Rules, *Numeration, Addition, Substraction, Multiplication, and
Division*.

NUMERATION

TEACHETH to *write* any Number named, and to *read* any Number written. Observe therefore the *Places, Names* and *Value* of the Figures in

The TABLE.

[illegible]

Likewise in Adding up Things of *various Names*, be sure to place all Numbers of the same Name under one another; Thus in *Addition of Muncy* set Pounds under Pounds, Shillings under Shillings, Pence under Pence. Then begin at the least Name, and for every such Number as makes One of the next Greater carry One thereto. For which End —

In *Addition* learn also perfectly to repeat the following *Tables*, viz. In —

MONEY.

Note, 4 Farthings make a Penny, 12 Pence a Shilling, and 20 Shillings a Pound.

PENCE TABLE.

Pence	s.	d.
20	is	1 8
30	—	2 6
40	—	3 4
50	—	4 2
60	—	5 0
70	—	5 10
80	—	6 8
90	—	7 6
100	—	8 4
110	—	9 2
120	—	10 0

SHILLINGS TABLE.

Shillings	l.	s.
20	is	1 0
30	—	1 10
40	—	2 0
50	—	2 10
60	—	3 0
70	—	3 10
80	—	4 0
90	—	4 10
100	—	5 0
110	—	5 10
120	—	6 0

TROY WEIGHT.

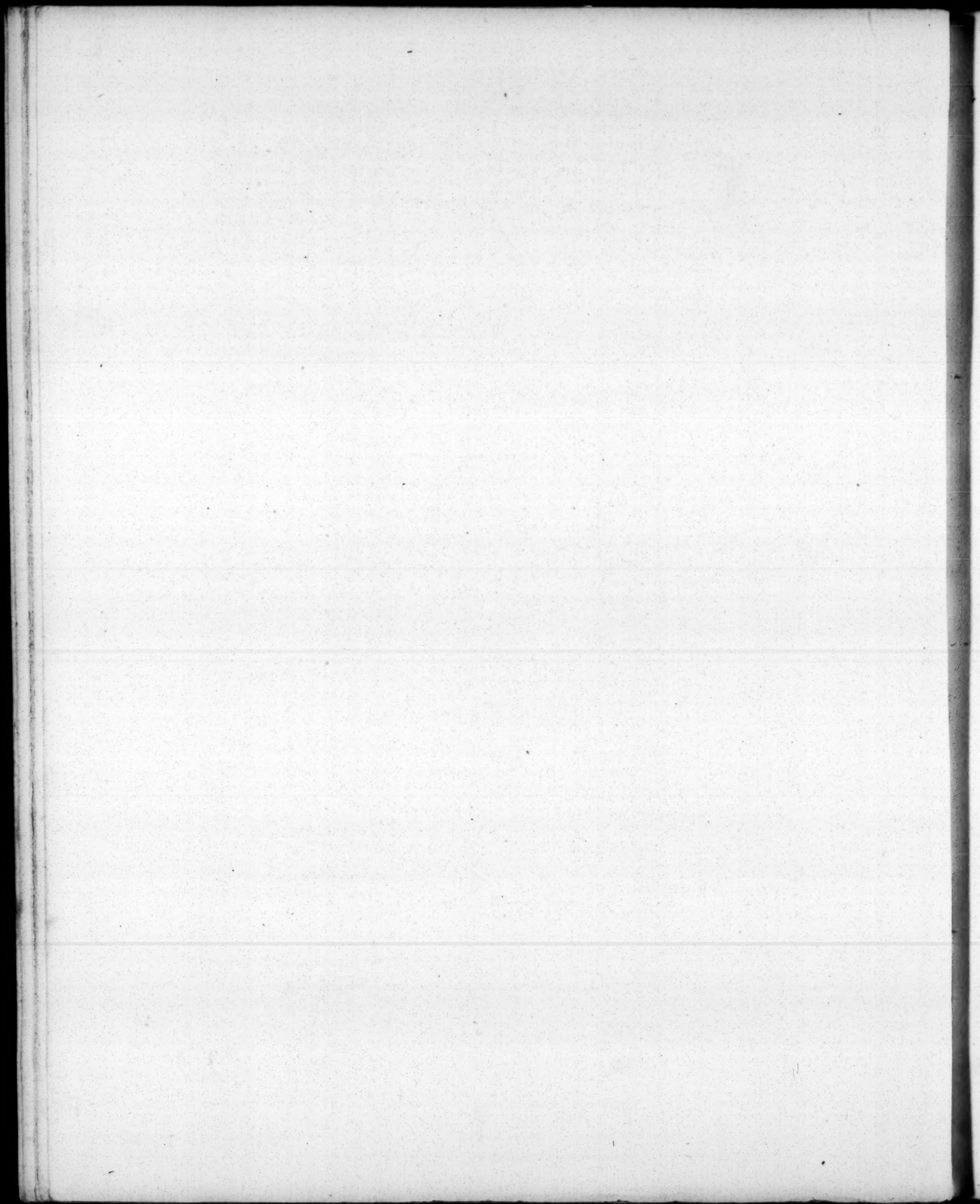
Note, 24 Grains make a Pennyweight, 20 Pennyweights an Ounce, and 12 Ounces a Pound.

APOTHECARIES WEIGHT.

Note, 20 Grains make a Scruple, 3 Scruples a Dram, 8 Drams an Ounce, and 12 Ounces a Pound *Troy*.

AVOIR

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AVOIRDUPOIS WEIGHT.

Note, 16 Drams make an Ounce, 16 Ounces a Pound, 14 Pounds a Stone, 2 Stone or 28 Pounds a Quarter of an Hundred, 4 Quarters an Hundred Weight, and 20 Hundred a Ton.

WOOL WEIGHT.

Note, 7 Pounds *Avoirdupois* make a Clove, 2 Cloves a Stone, 2 Stones a Todd, 13 Stones or 6 Todds and $\frac{1}{2}$ a Wey, 2 Weys a Sack, and 12 Sacks a Laft.

WINE MEASURE.

Note, 2 Pints make a Quart, 4 Quarts a Gallon, 63 Gallons an Hogshead, 2 Hogsheads a Pipe or Butt, and 2 Pipes a Tun.

Observe also, that 10 Gallons is an Anchor, 18 Gallons a Runlet, 43 Gallons a Tierce, 2 Tierce a Puncheon; and that a Tun of Wine is equal to about 18 Hundred Weight *Avoirdupois*.

BEER and ALE MEASURE.

Note, 2 Pints make a Quart, 4 Quarts a Gallon, 8 Gallons and $\frac{1}{2}$ a Firkin, 17 Gallons or 2 Firkins a Kilderkin, 2 Kilderkins a Barrel, and 3 Barrels a Butt.

DRY MEASURE.

Note, 8 Pints make a Gallon, 2 Gallons a Peck, 4 Pecks a Bushel, 4 Bushels a Comb, 2 Combs or 8 Bushels a Quarter, and 10 Quarters a Laft.

But Observe, in *Norfolk* a Laft full paid is 21 Combs or 10 Quarters and an half.

Observe also, that in COAL MEASURE 9 Bushels heaped make a Vât, and 4 Vatts or 36 Bushels make a Chaldron.

LONG MEASURE.

Note, 3 Barley-Corns make an Inch, 12 Inches a Foot, 3 Feet a Yard, 5 Yards and $\frac{1}{2}$ a Pole, Perch or Rod, 40 Poles or 220 Yards a Furlong, 8 Furlongs a Mile, 3 Miles a League, 20 Leagues

Leagues or 60 Miles a Degree, and 360 Degrees is the supposed Circumference of the Globe of the Earth and Sea.

Observe here, that 2 Yards make a Fathom. Also that a *Geometrical Pace* is 5 Feet, and that an *English Mile* is 1056 such Paces or 1760 Yards.

LAND MEASURE.

Note, 40 Square Rods Poles or Perches make a Rood, and 4 Roods an Acre.

Observe here, that by a Statute of *King Edward the First*, Anno 1305, an Acre of Land was to contain 160 square Perches; That is, 40 Poles or Perches in Length and 4 in Breadth were to make a Statute Acre. Or, which is the same Thing, A Furlong or 220 Yards multiplied into 22 Yards are equal to 4840 the square Yards in an Acre.

CLOTH MEASURE.

Note, 2 Inches and $\frac{1}{4}$ make a Nail, 4 Nails a Quarter, 4 Quarters a Yard, 3 Quarters an Ell *Flemish*, 5 Quarters an Ell *English*, and 6 Quarters an Ell *French*.

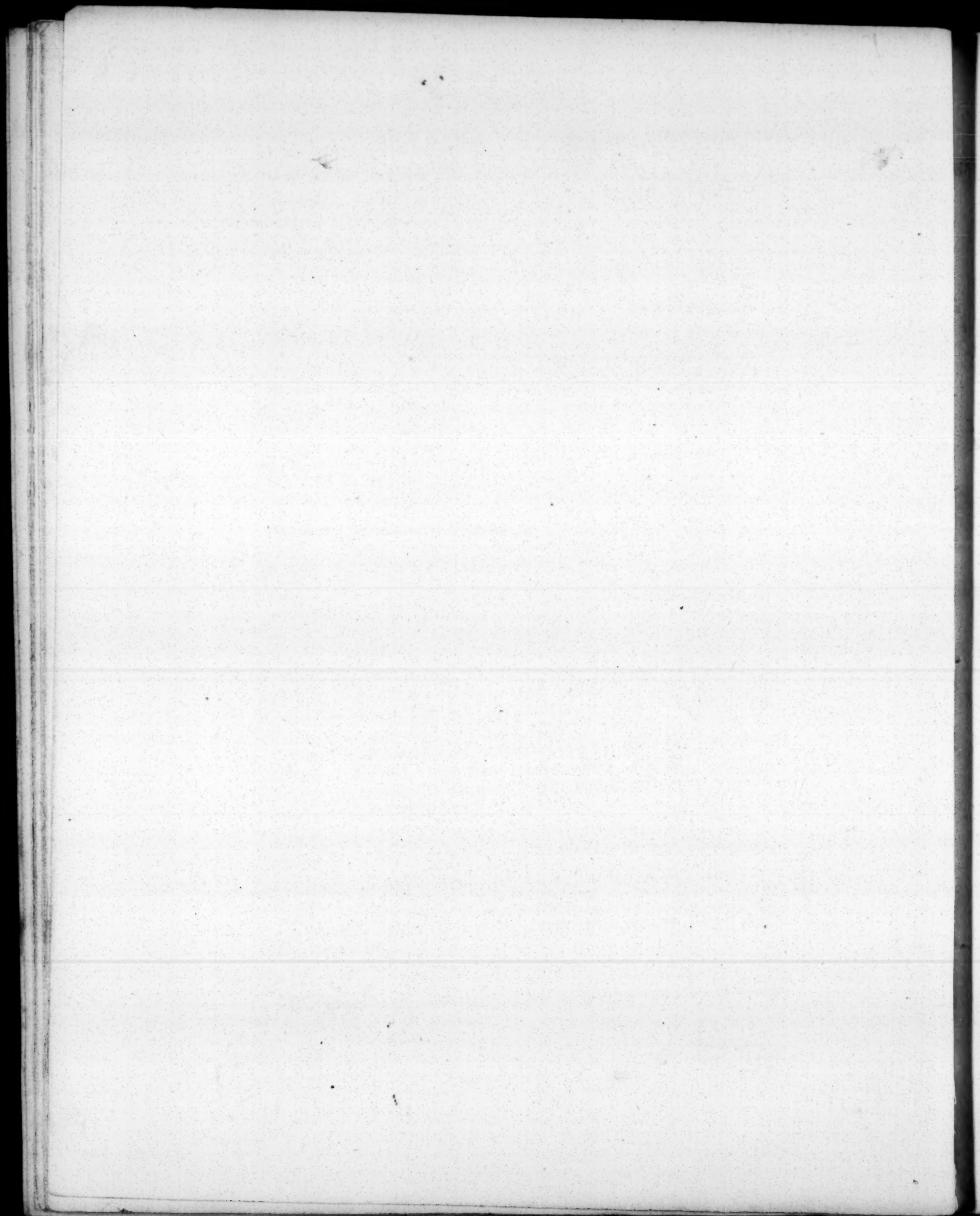
TIME.

Note, 60 Seconds or Moments make a Minute, 60 Minutes an Hour, 24 Hours a Natural Day, 7 Days a Week, 4 Weeks a Month, and 12 Months 1 Day 6 Hours, or 52 Weeks 1 Day 6 Hours, or 365 Days 6 Hours, make a Year.

The Year is also divided into 12 Calendar Months, *January*; *February*, *March*, *April*, *May*, *June*, *July*, *August*, *September*, *October*, *November*, *December*. The Days in each of which may be remembered thus,

Thirty Days hath *September*, *Febr'ary* Twenty-eight alone :
April, *June*, and *November*; And All the rest have Thirty-one.

Observe here, that the exact *Solar Year* consists but of 365 Days 5 Hours 48 Minutes and 57 Moments; Tho' the Common or *Julian Year* is said to contain 365 Days 6 Hours: which odd 6 Hours every fourth Year making a Day are added to *February*, which has then 29 Days, and the Year is called *Bissextile* or Leap-Year.



EXAMPLES IN MONEY.

l. s. d.	l. s. d.	l. s. d.	l. s. d. q.
247 11 10 $\frac{1}{2}$	173 15 11 $\frac{1}{4}$	372 13 .8 $\frac{1}{2}$	176 15 10 2
367 15 18	204 17 19	505 11 .2 $\frac{1}{4}$	710 14 6 8
742 13 7 $\frac{3}{4}$	731 12 19 $\frac{1}{2}$	741 11 10 $\frac{1}{4}$	245 13 9 1
293 17 11 $\frac{1}{4}$	274 11 10 $\frac{1}{2}$	243 18 11 $\frac{1}{2}$	372 15 11 3
147 16 7 $\frac{1}{2}$	392 17 18 $\frac{3}{4}$	121 13 .9 $\frac{3}{4}$	142 12 8 1
178 18 8 $\frac{1}{4}$	781 13 11 $\frac{1}{4}$	428 14 10 $\frac{1}{2}$	152 14 10 1
1948 5 2 $\frac{1}{4}$	2219 12 6 $\frac{1}{2}$	241 4 4 $\frac{1}{2}$	1801 7 10 $\frac{3}{4}$
707 4 10 $\frac{1}{4}$			
1948 5 2 $\frac{1}{4}$	59 11 8 $\frac{1}{4}$		
l. s. d.	l. s. d.	l. s. d.	l. s. d.
712 13 10 $\frac{1}{4}$	942 18 10 $\frac{1}{4}$	172 11 10 $\frac{3}{4}$	272 10 11 $\frac{1}{2}$
231 14 13	341 10 8	914 15 14	561 11 9
418 11 11 $\frac{1}{2}$	571 13 9 $\frac{1}{2}$	213 15 9 $\frac{1}{4}$	721 17 8 $\frac{1}{4}$
321 15 8 $\frac{1}{4}$	143 17 11 $\frac{1}{2}$	324 17 8 $\frac{1}{2}$	357 15 1 $\frac{1}{2}$
132 17 9 $\frac{1}{4}$	213 18 7 $\frac{1}{4}$	741 13 7 $\frac{1}{4}$	372 19 11 $\frac{1}{4}$
142 14 6 $\frac{1}{4}$	237 13 9	741 14 10 $\frac{1}{4}$	782 18 5 $\frac{3}{4}$
2332 9 4 $\frac{1}{2}$	2451 13 8		
2011 6 3 $\frac{1}{4}$			
2332 9 4 $\frac{1}{2}$			
l. s. d.	l. s. d.	l. s. d.	l. s. d.
321 13 10 $\frac{1}{2}$	174 17 11 $\frac{1}{2}$	329 11 10 $\frac{1}{2}$	157 14 11 $\frac{1}{4}$
513 14 16	370 12 6	721 11 8	558 11 6
682 11 9 $\frac{3}{4}$	761 15 9 $\frac{1}{4}$	358 19 7 $\frac{1}{4}$	721 19 8 $\frac{3}{4}$
257 17 11 $\frac{1}{4}$	219 11 8 $\frac{1}{2}$	241 14 10 $\frac{3}{4}$	145 17 10 $\frac{1}{2}$
234 15 6 $\frac{1}{2}$	325 12 10 $\frac{1}{2}$	287 11 8 $\frac{1}{4}$	314 13 9 $\frac{1}{4}$
321 13 10 $\frac{1}{4}$	324 17 7 $\frac{3}{4}$	287 19 5 $\frac{1}{2}$	427 14 4 $\frac{1}{4}$
l. s. d.	l. s. d.	l. s. d.	l. s. d. q.
145 15 11 $\frac{1}{4}$	394 15 9 $\frac{1}{4}$	843 14 5 $\frac{1}{2}$	272 11 8 1
342 16 4	732 10 5	214 13 4	823 17 4 2
472 11 9 $\frac{3}{4}$	543 13 10 $\frac{1}{2}$	632 12 4 $\frac{1}{4}$	741 19 11 2
241 17 8 $\frac{1}{2}$	272 10 9 $\frac{1}{4}$	321 19 10 $\frac{1}{4}$	342 17 7 1
142 15 1 $\frac{1}{4}$	321 11 5 $\frac{1}{2}$	319 18 5 $\frac{1}{2}$	471 13 10 2
152 18 11 $\frac{1}{2}$	572 12 11 $\frac{1}{4}$	427 16 11 $\frac{3}{4}$	524 16 6 3
307 11 4			
			2629 3 8 $\frac{1}{4}$
			2629 3 8 $\frac{1}{4}$

B

EXAM-

EXAMPLES IN MONEY.

l. s. d. 354 14 11 $\frac{1}{2}$ 5 721 18 7 $\frac{1}{4}$ 321 13 10 $\frac{3}{4}$ 215 17 9 $\frac{1}{4}$ 8 $\frac{1}{2}$	l. s. d. 472 11 10 $\frac{1}{2}$ 3 423 15 7 $\frac{1}{2}$ 574 17 1 $\frac{1}{4}$ 372 14 11 $\frac{1}{2}$ 2 $\frac{1}{4}$	l. s. d. 721 18 11 $\frac{3}{4}$ 4 521 16 7 $\frac{1}{2}$ 346 11 6 $\frac{3}{4}$ 572 17 8 $\frac{1}{2}$ 10 $\frac{1}{4}$	l. s. d. 321 14 10 $\frac{1}{2}$ 5 472 18 1 $\frac{3}{4}$ 243 18 11 $\frac{1}{4}$ 598 12 8 $\frac{1}{2}$ 10 $\frac{1}{4}$
l. s. d. 786 19 2 $\frac{3}{4}$ 2 523 12 10 $\frac{1}{2}$ 241 13 7 $\frac{1}{4}$ 176 10 11 $\frac{1}{2}$ 7 $\frac{1}{4}$	l. s. d. 272 15 8 $\frac{1}{4}$ 7 421 16 7 $\frac{1}{2}$ 537 17 8 $\frac{1}{2}$ 312 14 6 $\frac{1}{2}$ 11 $\frac{1}{4}$	l. s. d. 327 17 4 $\frac{1}{2}$ 8 721 15 3 $\frac{1}{4}$ 368 13 10 $\frac{1}{2}$ 215 16 11 $\frac{1}{4}$ 3 $\frac{1}{2}$	l. s. d. q. 521 17 11 2 4 274 18 7 1 341 15 10 1 172 11 2 3 11 3
l. s. d. 787 13 8 $\frac{1}{2}$ 3 423 15 6 $\frac{3}{4}$ 212 12 10 $\frac{1}{2}$ 321 19 11 $\frac{1}{4}$ 3 $\frac{3}{4}$	l. s. d. 273 11 10 $\frac{1}{2}$ 6 715 13 8 $\frac{1}{4}$ 321 17 10 $\frac{1}{2}$ 472 16 11 $\frac{1}{2}$ 2 $\frac{1}{2}$	l. s. d. 157 18 3 $\frac{1}{2}$ 521 13 7 $\frac{3}{4}$ 2 765 18 11 $\frac{1}{2}$ 281 12 10 $\frac{1}{4}$ 4 $\frac{3}{4}$	l. s. d. q. 321 16 7 2 6 217 18 11 3 542 17 8 1 325 10 10 2 11 3
l. s. d. 276 19 8 $\frac{1}{4}$ 3 742 15 11 $\frac{1}{2}$ 374 12 9 $\frac{1}{2}$ 472 13 10 $\frac{1}{2}$ 8 $\frac{1}{2}$	l. s. d. 374 15 6 $\frac{1}{2}$ 1 769 19 10 $\frac{3}{4}$ 176 15 11 $\frac{1}{2}$ 321 17 10 $\frac{1}{4}$ 5 $\frac{1}{2}$	l. s. d. 382 19 10 $\frac{1}{2}$ 8 765 14 3 $\frac{1}{4}$ 982 11 10 $\frac{1}{2}$ 321 19 7 $\frac{1}{2}$ 11 $\frac{3}{4}$	l. s. d. q. 721 18 10 2 4 612 15 11 1 214 13 10 3 218 19 8 3 11 2

EXAM-

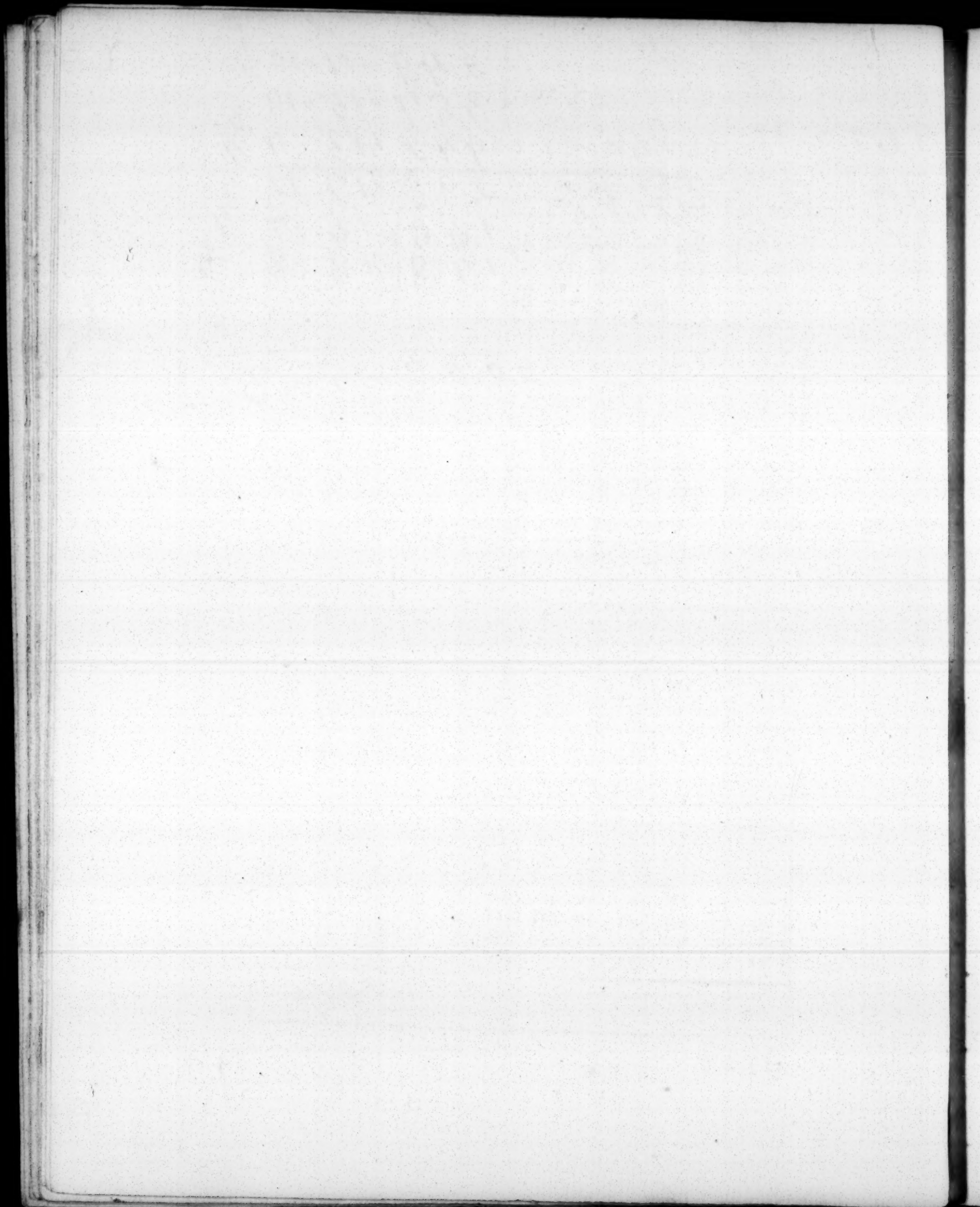
$\mathcal{L}$	$\mathcal{S}$	$\mathcal{D}$	
172	10	11	$\frac{1}{2}$
561	11	9	$\frac{1}{4}$
721	17	8	$\frac{1}{2}$
857	15	1	$\frac{1}{2}$

$\mathcal{L}$	$\mathcal{S}$	$\mathcal{D}$	
247	17	10	$\frac{1}{2}$
367	15	18	$\frac{3}{4}$
742	13	7	$\frac{1}{4}$
293	17	11	$\frac{1}{4}$
147	16	7	$\frac{1}{4}$
178	18	8	$\frac{1}{2}$
			$\frac{1}{2}$

$\mathcal{L}$	$\mathcal{S}$	$\mathcal{D}$	
1812	15	8	$\frac{1}{4}$
		6	$\frac{1}{4}$

20.08.15.3 $\frac{1}{2}$

176	15	106	2
710	14	6	8
245	13	9	1
872	15	11	3
142	12	8	1
152	11	10	
801	5	17	3



[11]

EXAMPLES IN MONEY.

l. s. d.	l. s. d.	l. s. d.	l. s. d. q.
273 17 11 $\frac{1}{2}$	547 11 10 $\frac{1}{2}$	672 10 10 $\frac{3}{4}$	325 17 11 2
5	3	5	7
721 19 10 $\frac{3}{4}$	421 13 11 $\frac{1}{2}$	721 13 11 $\frac{1}{2}$	218 15 10 2
472 14 9 $\frac{1}{2}$	573 18 8 $\frac{1}{4}$	253 17 8 $\frac{1}{4}$	187 19 11 3
174 18 11 $\frac{3}{4}$	374 15 10 $\frac{1}{2}$	718 15 9 $\frac{3}{4}$	374 14 10 1
11 $\frac{1}{2}$	11 $\frac{1}{2}$	11 $\frac{1}{2}$	9 3
l. s. d.	l. s. d.	l. s. d.	l. s. d. q.
621 13 10 $\frac{1}{4}$	719 15 11 $\frac{1}{4}$	374 16 10 $\frac{1}{4}$	174 17 10 2
4	8	7	3
576 11 8 $\frac{1}{4}$	654 13 8 $\frac{3}{4}$	146 17 8 $\frac{1}{2}$	726 14 8 3
321 17 11 $\frac{1}{2}$	572 17 10 $\frac{1}{2}$	317 18 11 $\frac{1}{4}$	172 13 11 2
421 19 8 $\frac{1}{4}$	346 13 8 $\frac{1}{4}$	142 17 2 $\frac{1}{2}$	543 12 6 1
10 $\frac{1}{2}$	11 $\frac{1}{2}$	10 $\frac{1}{4}$	11 3
l. s. d.	l. s. d.	l. s. d.	l. s. d. q.
742 18 11 $\frac{1}{2}$	214 13 10 $\frac{1}{2}$	329 17 11 $\frac{1}{4}$	719 17 10 3
5	9	4	3
471 17 10 $\frac{3}{4}$	714 18 11 $\frac{1}{4}$	278 13 10 $\frac{1}{2}$	214 17 11 2
372 16 11 $\frac{1}{2}$	362 12 8 $\frac{3}{4}$	754 17 8 $\frac{3}{4}$	542 14 8 1
721 14 8 $\frac{1}{2}$	273 11 10 $\frac{1}{2}$	987 16 11 $\frac{1}{4}$	372 15 10 1
10 $\frac{3}{4}$	11 $\frac{1}{4}$	10 $\frac{1}{2}$	9 3
l. s. d.	l. s. d.	l. s. d.	l. s. d. q.
314 15 10 $\frac{1}{2}$	214 18 11 $\frac{1}{4}$	374 15 10 $\frac{3}{4}$	154 13 10 2
6	7	2	7
521 14 11 $\frac{3}{4}$	315 17 9 $\frac{3}{4}$	745 17 11 $\frac{1}{4}$	162 11 11 1
242 13 8 $\frac{1}{2}$	142 14 10 $\frac{1}{2}$	321 14 10 $\frac{1}{4}$	357 10 8 3
742 17 11 $\frac{1}{2}$	319 15 11 $\frac{1}{4}$	185 13 9 $\frac{3}{4}$	154 16 10 2
9	3 $\frac{3}{4}$	11 $\frac{3}{4}$	11 3

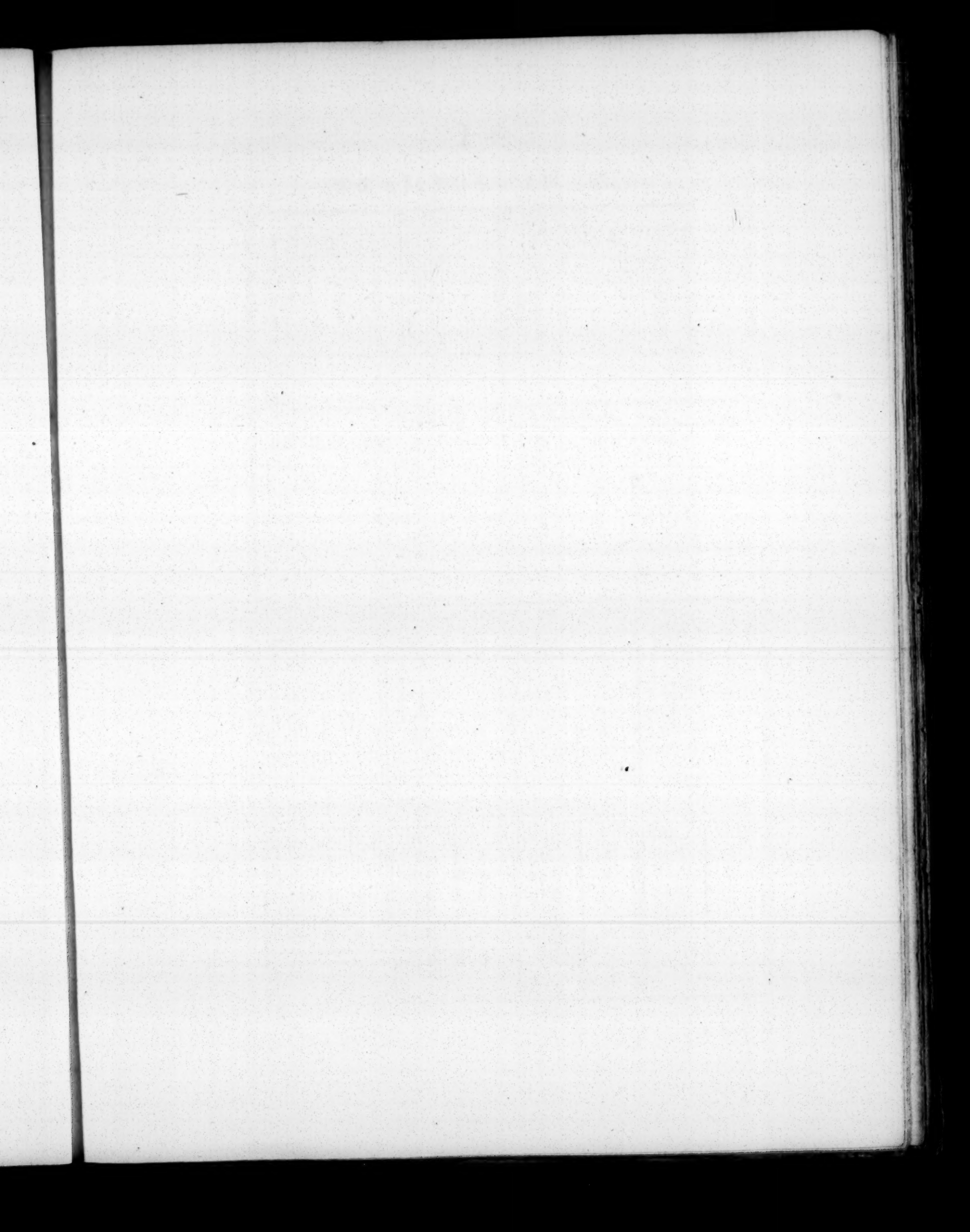
EXAMPLES IN *Weights.*

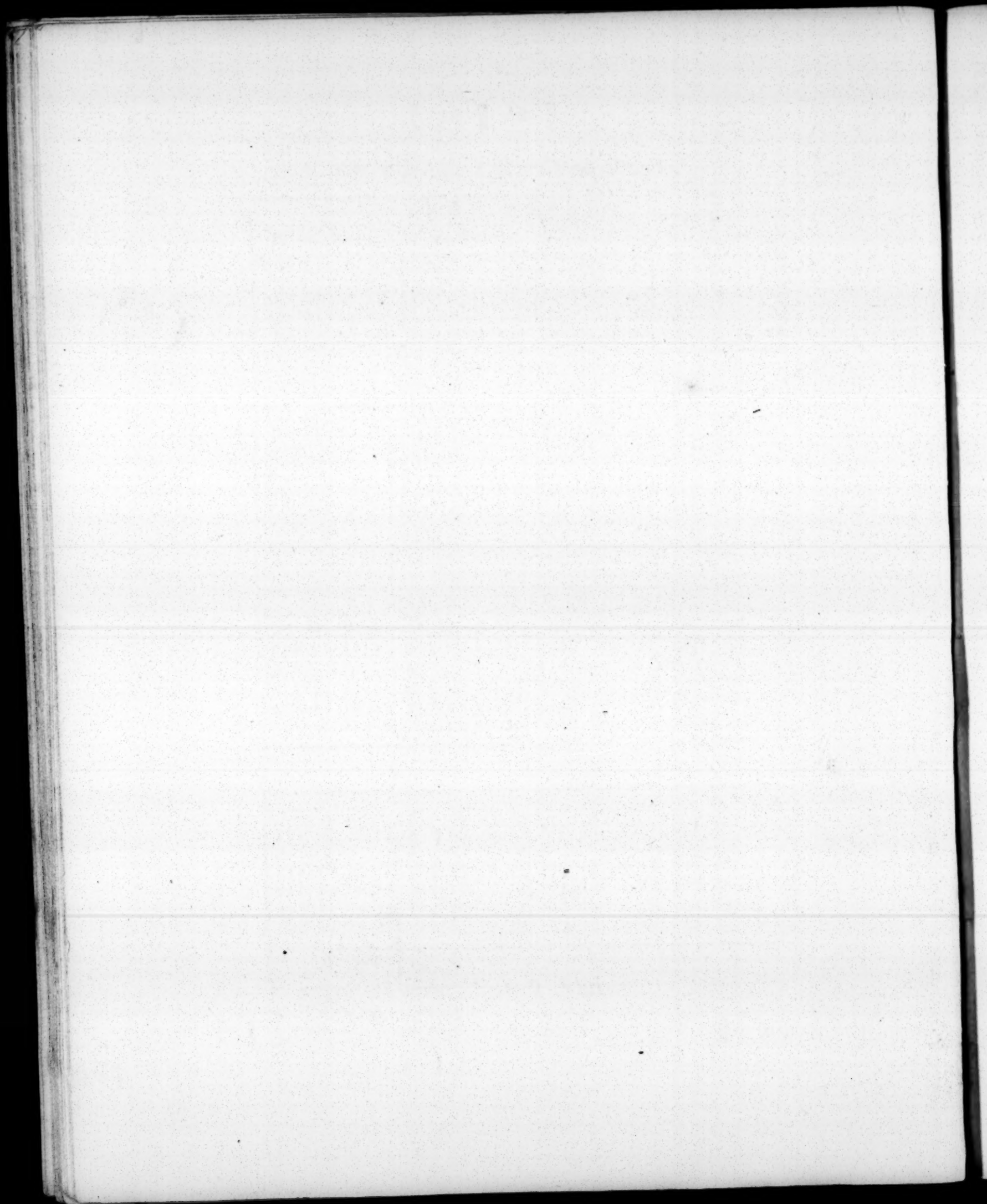
TROY WEIGHT.															
lb oz dwts gr				lb oz dwts gr				lb oz dwts gr				lb oz dwts gr			
243	11	17	18	543	10	19	21	217	9	17	21	142	11	19	23
7				3				5				4			
352	10	15	17	521	11	17	18	312	10	14	18	213	9	14	19
121	11	13	11	721	10	14	22	152	11	13	22	347	10	13	21
52	9	16	8	14	9	11	15	43	10	15	11	72	8	15	12

APOTHECARIES WEIGHT.															
lb. ʒ. ʒ. ʒ.				lb. ʒ. ʒ. ʒ.				ʒ. ʒ. ʒ. gr.				ʒ. ʒ. ʒ. gr.			
273	5	7	1	543	6	6	2	174	7	2	17	247	6	1	15
4				3				4				3			
317	11	6	2	741	10	7	1	715	5	1	19	147	7	2	17
142	10	5	1	324	9	3	2	413	2	2	14	235	2	1	14
41	9	3	2	18	11	5	1	32	6	1	13	14	5	2	11

AVOIRDUPOIS WEIGHT.															
St. lb. oz. dr.				St. lb. oz. dr.				lb. oz. dr.				lb. oz. dr.			
152	11	12	11	272	13	14	11	7421	13	15		2457	15	14	
3				5				3				7			
215	13	13	11	421	11	12	13	2174	11	12		3121	13	12	
421	12	15	14	137	11	15	10	3121	12	14		4317	14	11	
41	10	11	7	32	12	11	12	246	15	11		121	10	15	
Tons ʘ qrs lb.				Tons ʘ qrs lb.				Tons ʘ qrs lb.				St. lb. oz. dr.			
421	17	2	19	321	16	3	18	127	15	2	11	271	10	13	11
3				4				3				4			
572	16	3	21	724	15	2	17	213	13	3	12	712	12	11	12
121	14	2	11	242	16	1	14	174	12	1	11	272	11	14	7
352	15	1	17	174	15	2	7	231	14	2	7	572	13	15	2
21	13	3	11	42	14	3	11	74	15	3	11	32	12	11	13

EXAM.





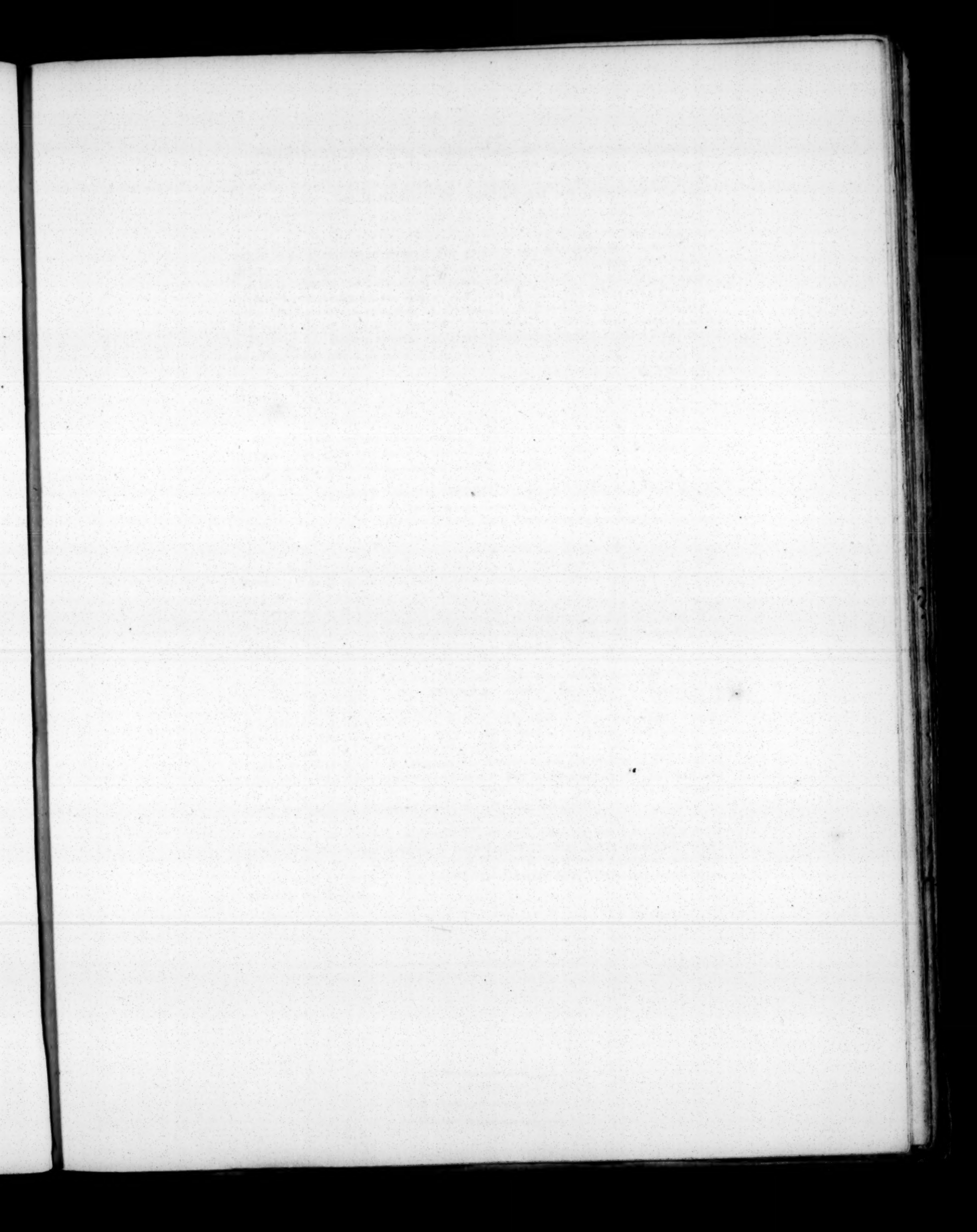
EXAMPLES IN Measures.

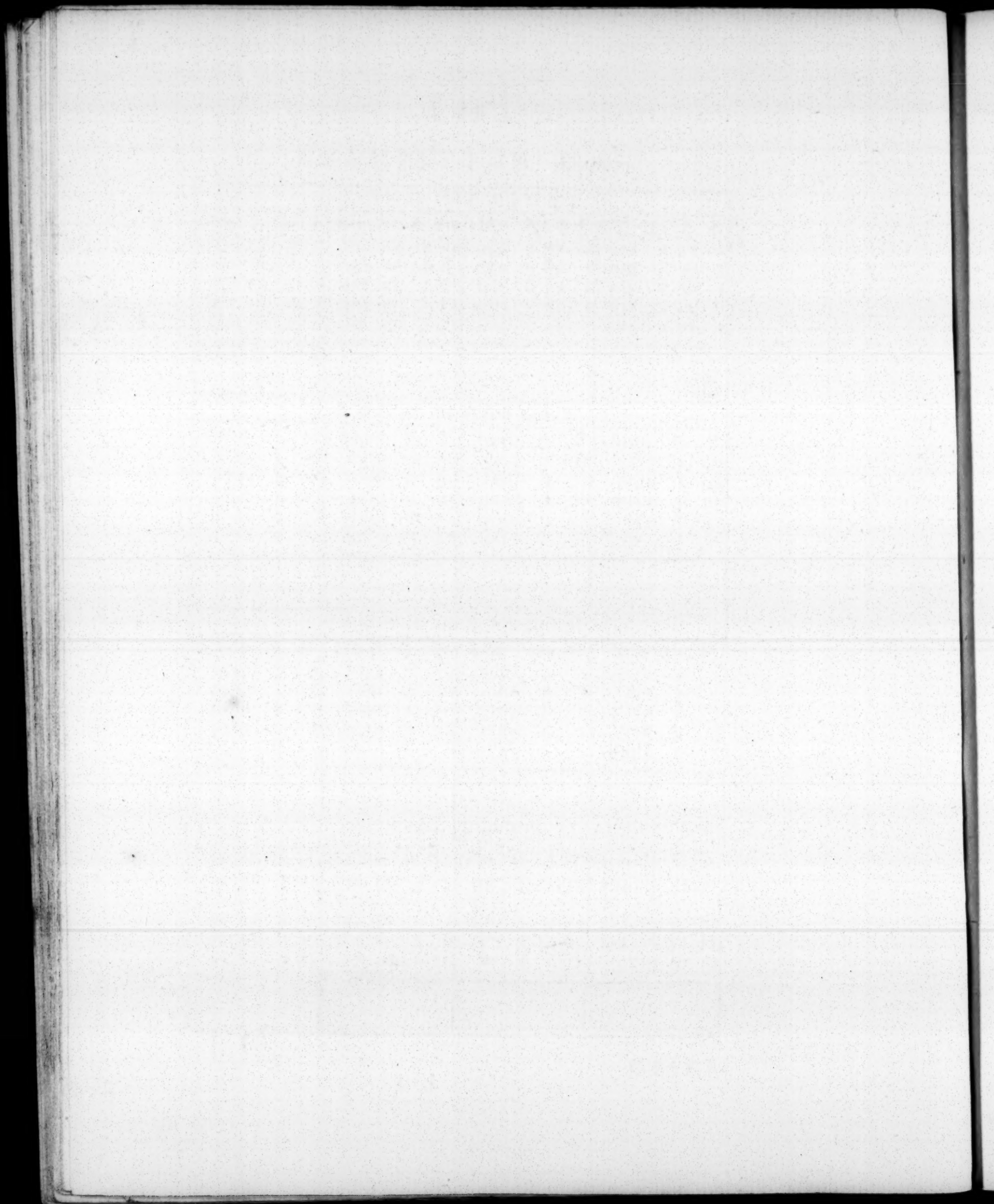
WOOL WEIGHT.															
Lafte S. W. St.				Lafte S. W. St.				Tods St. Cl. lb.				Tods St. Cl. lb.			
342	11	1	11	421	10	1	9	124	1	1	6	347	1	0	5
4				2				3				4			
323	10	1	10	741	11	1	12	721	0	1	5	322	1	1	6
125	11	1	9	144	10	1	11	341	1	1	4	142	0	1	4
42	10	1	11	37	9	0	10	12	1	1	5	51	1	1	5
WINE MEASURE.															
Tune P. H. Gal				Tons P. H. Gal				Hds G. Q. P.				Hds G. Q. P.			
124	1	1	42	359	1	1	37	721	52	3	1	614	37	2	1
3				1				4				3			
761	1	0	57	324	1	1	22	271	41	2	1	215	57	3	1
341	0	1	61	436	1	1	51	122	61	3	1	742	41	2	1
52	1	1	48	17	0	1	61	79	22	1	0	27	29	3	1
BEER and ALE MEASURE.															
Butts B. K. F.				Butts B. K. F.				Kild. G. Q. P.				Kild. G. Q. P.			
742	2	1	1	513	2	1	1	134	15	3	1	712	13	2	1
3				7				5				2			
712	1	1	1	217	1	1	0	741	11	2	1	324	11	3	0
471	2	1	1	318	2	1	1	217	13	1	1	172	15	2	1
51	2	0	1	72	2	0	1	72	14	3	0	46	12	3	1
DRY MEASURE.															
Lafte qrs. B. P.				Qrs. B. P. G.				Com. B. P. G.				Bush. P. G. Pin.			
325	9	7	3	124	7	3	1	421	3	2	1	178	3	1	7
4				391	8	7	5	582	6	8	4	861	8	8	9
712	8	6	2	712	6	2	1	423	2	3	0	741	2	1	5
321	7	5	3	218	5	3	1	174	1	2	1	347	3	1	6
41	9	4	2	172	7	2	0	221	2	3	1	274	2	0	7
				1613 0 1 0				4 1				2207 3 1 2			
				1835 0 0 1											

EXAMPLES IN *Measures.*

LONG MEASURE.											
Deg.	L.	M.	F.	Deg.	M.	F.	Yds.	Miles	F.	Yds.	F.
472	19	2	7	721	16	7	84	243	7	91	2
281	10	2	2	314	11	2	8	481	3	21	1
184	17	1	6	412	42	1	91	312	6	72	1
341	18	2	5	324	47	6	82	422	7	51	2
274	16	2	7	141	53	7	73	152	5	42	1
1556"3"0"3											
LAND MEASURE.											
Acres.	R.	P.	Acres.	R.	P.	Acres.	R.	P.	Acres.	R.	P.
1231	3	38	2471	2	39	4217	3	32	1213	2	33
7842	8	12	1283	2	36	8621	8	71	5121	3	48
2151	2	26	4217	3	21	7142	2	17	7312	3	29
7143	3	32	3416	3	34	3124	3	31	1245	2	34
1124	2	31	4712	2	19	4541	2	38	1714	1	36
CLOTH MEASURE.											
Ells fr.	Q.	N.	Ells fl.	Q.	N.	Ells.	qrs.	N.	Yds.	qrs.	N.
1247	5	3	7254	2	3	2357	4	3	3572	3	2
7187	2	3	1181	8	6	4681	8	8	4181	8	1
2152	4	2	3241	1	2	7123	3	2	7214	2	3
7413	3	1	7418	2	3	2174	4	1	5718	3	3
1521	2	3	1121	1	2	1721	2	2	8478	2	3
TIME.											
Yea.	W.	D.	H.	Yea.	M.	W.	D.	Mon.	W.	D.	H.
421	51	5	23	172	11	3	5	325	3	6	21
2				2				4			
731	50	6	21	741	12	2	4	576	2	5	22
312	42	4	19	314	11	3	6	321	3	4	23
35	51	3	22	72	10	2	5	72	2	6	17
Days H. M. S.											
174	21	52	51								
2											
712	19	47	32								
121	17	31	17								
47	19	52	12								

OBSER-





OBSERVATIONS. The foregoing Sums are proposed to be perform'd in *Addition of Money*, and every particular *Weight* and *Measure*, immediately after the Scholar has got by Heart and repeated to the Master each particular *Table* or *Note*. Let him afterwards carefully read and understand the following *Observations*.

Obs. 1. In MONEY. When long Sums are to be added up in *Pence*, the easiest Way is to stop or make a *Dot* at every 60, for which we carry 5 Shillings. Note also, that *Pounds*, *Shillings*, *Pence*, and *Farthings*, are mark'd l. s. d. q. that is, by their *Latin* Names, *Librae*, *Solidi*, *Denarii*, *Quadrantes*, by which our *Accompts* are kept. But the usual *English* Coins are, a *Guinea* 21 s. *Half-a-Guinea* 10 s. 6 d. a *Crown* 5 s. *Half-a-Crown* 2 s. 6. a *Shilling*, *Six-pence*, *Groat* or 4 d. *Three-pence*, *Two-pence*, a *Penny*, *Half-penny* $\frac{1}{2}$, and a *Farthing* $\frac{1}{4}$. Besides which are these *Imaginary Pieces*, a *Mark* 13 s. 4 d. an *Angel* 10 s. and a *Noble* 6 s. 8 d.

Obs. 2. By TROY WEIGHT are weigh'd *Gold*, *Silver*, *Jewels*, and *Liquors*. The Marks are, lb. oz. dwts. gr. *Pounds*, *Ounces*, *Pennyweights*, *Grains*.

Obs. 3. By APOTHECARIES WEIGHT, their *Medicines* are compounded; but they buy and sell their *Drugs* by *Avoirdupois*. Their Marks are, lb. 3. 3. 3. gr. *Pounds*, *Ounces*, *Drams*, *Scruples*, *Grains*.

Obs. 4. AVOIRDUPOIS WEIGHT, whose Marks are, *Tons*, *Hund.* *qrs.* *St.* *lb.* *oz.* *dr.* is now become the *Common Weight* of *England* for *Iron*, *Lead*, *Copper*, *Flesh*, *Cheese*, *Butter*, *Salt*, *Sugar*, and all other *Gross Commodities*. It is so called from the *French*, *Avoir du pois*, To have of the *Weight*; that is, To have more than *Weight*; a *Pound Avoirdupois* being about a sixth Part more than a *Pound Troy*, which was the *Common Weight* before. The Proportion is, One *Pound Avoirdupois* is equal to 14 oz. 11 dwts. 15 $\frac{1}{2}$ gr. *Troy*; an *Ounce Troy* being equal to about 1 oz. 1 $\frac{1}{2}$ *Dram Avoirdupois*. — Observe also, a *Stone of Flesh* in *London* is but 8 lb. a *Stone of Hemp* is 32 lb. and a *Fodder of Lead* is 19 $\frac{1}{2}$ *Hund.* — *Oilmen* and *Distillers* often buy and sell their *Oils* and *Spirits* by *Weight*, allowing 7 $\frac{1}{2}$ lb. *Avoirdupois* for a *Gallon of Oil*, and 7 $\frac{3}{4}$ lb. for a *Gallon of Spirits*.

Obs. 5. Formerly there was but one *Weight* and one *Measure* used throughout *England*; but *Time* and *Custom* have alter'd *Measures* as they have done *Weights*. For now we have three Sorts, *Wine*, *Beer*, and *Corn*. By *WINE MEASURE* are sold all *Wines*, *Spirits*, *Oil*, *Honey*, *Vinegar*, *Sider*, *Perry*, *Mead*, &c. the *Gallon* being 231 *Cubick Inches*. *BEER MEASURE* is much larger, the *Gallon* being 282 *Cubick Inches*; 9 of which *Gallons* in *London* is a *Firkin of Beer*, and but 8 a *Firkin of Ale*; a *Firkin of Soap* and of *Herring* are the same with that of *Ale*: But in all other Places *Beer* and *Ale* are alike, viz. a *Firkin* is 8 $\frac{1}{2}$ *Gallons*. *DRY MEASURE* is betwixt both, a *Winchester Gallon* being about 269 *Cubick Inches*.

Obs. 6. In LONG MEASURE observe, that 'tis found by Experiment that a *Degree* is upwards of 69 $\frac{1}{2}$ *English Miles*: We should therefore rather say 70 than 60. Hence if such a *Degree* is 20 *French Leagues*, each such *League* must be about 3 $\frac{1}{2}$ *English Miles*. — Observe also, that a *Hand* in *Horsemanship* is 4 *Inches*.

MORE

MORE EXAMPLES in ADDITION, if required.

What's the Total of 6 Bags of *Money*, in each 324 l. 11 s. 7 d. $\frac{1}{4}$. — Add together 7 Times 1324 l. 11 s. 9 d. $\frac{1}{4}$. — Add 6 Times 1278 l. 14 s. 3 d. $\frac{3}{4}$. — Add 9 Times 672 l. 13 s. 4 d. $\frac{1}{4}$. — Add 8 Times 532 l. 17 s. 11 d. $\frac{3}{4}$. — How much is Ten Times 456 l. 12 s. 9 d. $\frac{1}{4}$. — Add 7 Times 146 l. 17 s. 10 d. $\frac{3}{4}$. — What's the Weight of 7 *Silver* Dishes, each 4 lb. 11 oz. 14 dwts. 12 gr. — Eight Bags of *Hops*, each 3 hund. 2 qrs. 17 lb. 14 oz. 13 dr. — Six Ships of *Wine*, in each 46 Tun, 1 Pipe, 1 Hogshead, 48 Gallons. — Eight Waggons of *Wheat*, in each 3 Lafts, 9 Quarters, 7 Bushels, 3 Pecks. — Nine Packs of *Cloth*, in each 374 Ells, 3 Quarters, 2 Nails, &c.

S U B-

$$4) 872657 (218164$$

$$\begin{array}{r} 8 \\ \hline 07 \\ \underline{4} \\ 32 \\ \underline{32} \\ 06 \\ \underline{4} \\ 25 \\ \underline{24} \\ 17 \\ \underline{16} \\ 1 \end{array}$$

$$6) 387268 (64544$$

$$\begin{array}{r} 36 \\ \hline 27 \\ \underline{24} \\ 32 \\ \underline{30} \\ 26 \\ \underline{24} \\ 28 \\ \underline{24} \\ 4 \end{array}$$

$$7) 987265 (14037$$

$$\begin{array}{r} 7 \\ \hline 28 \\ \underline{28} \\ 726 \\ \underline{21} \\ 55 \\ \underline{49} \\ 6 \end{array}$$

$$8) 256726 (3290$$

$$\begin{array}{r} 24 \\ \hline 16 \\ \underline{16} \\ 72 \\ \underline{72} \\ 6 \end{array}$$

MORE EXAMPLES in ADDITION, if required.

What's the Total of 6 Bags of *Money*, in each 324 l. 11 s. 7 d. $\frac{1}{2}$. — Add together 7 Times 1324 l. 11 s. 9 d. $\frac{1}{4}$. — Add 6 Times 1278 l. 14 s. 3 d. $\frac{3}{4}$. — Add 9 Times 672 l. 13 s. 4 d. $\frac{1}{4}$. — Add 8 Times 532 l. 17 s. 11 d. $\frac{3}{4}$. — How much is Ten Times 456 l. 12 s. 9 d. $\frac{1}{4}$. — Add 7 Times 146 l. 17 s. 10 d. $\frac{3}{4}$. — What's the Weight of 7 *Silver* Dishes, each 4 lb. 11 oz. 14 dwts. 12 gr. — Eight Bags of *Hops*, each 3 hund. 2 qrs. 17 lb. 14 oz. 13 dr. — Six Ships of *Wine*, in each 46 Tun, 1 Pipe, 1 Hoghead, 48 Gallons. — Eight Waggon of *Wheat*, in each 3 Lafts, 9 Quarters, 7 Bushels, 3 Pecks. — Nine Packs of *Cloth*, in each 374 Ells, 3 Quarters, 2 Nails, &c.

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$$8) 256726 (3290$$

$$\begin{array}{r} 24 \\ \hline 16 \\ \underline{16} \\ 72 \\ \underline{72} \\ 6 \end{array}$$

$$9) 769\dot{2}\dot{7}\dot{2}6 \left(854747 \right.$$

$$\begin{array}{r} 72 \\ \hline 49 \\ 45 \end{array}$$

$$\begin{array}{r} 42 \\ 36 \end{array}$$

$$\begin{array}{r} 67 \\ 63 \end{array}$$

$$\begin{array}{r} 42 \\ 36 \end{array}$$

$$\begin{array}{r} 66 \\ 63 \\ 3 \end{array}$$

$$9) 876\dot{2}\dot{7}\dot{2}6 \left(973636 \right.$$

$$\begin{array}{r} 81 \\ \hline 66 \\ 63 \end{array}$$

$$\begin{array}{r} 32 \\ 27 \end{array}$$

$$\begin{array}{r} 57 \\ 54 \end{array}$$

$$\begin{array}{r} 32 \\ 27 \end{array}$$

$$\begin{array}{r} 56 \\ 54 \end{array}$$

$$\begin{array}{r} 2 \end{array}$$

$$7) 68\dot{9}\dot{2}\dot{7}3 \left(98467 \right.$$

$$\begin{array}{r} 63 \\ \hline 58 \\ 56 \end{array}$$

$$\begin{array}{r} 29 \\ 28 \end{array}$$

$$\begin{array}{r} 12 \\ 42 \end{array}$$

$$\begin{array}{r} 53 \\ 49 \\ \hline 4 \end{array}$$

$$8) 256726 \left(320908 \right.$$

$$\begin{array}{r} 24 \\ \hline 16 \\ 16 \end{array}$$

$$\begin{array}{r} 72 \\ 72 \end{array}$$

$$\begin{array}{r} 6 \end{array}$$

$$\begin{array}{r} 320908 \\ \hline 256720 \\ 6 \end{array}$$



SUBTRACTION

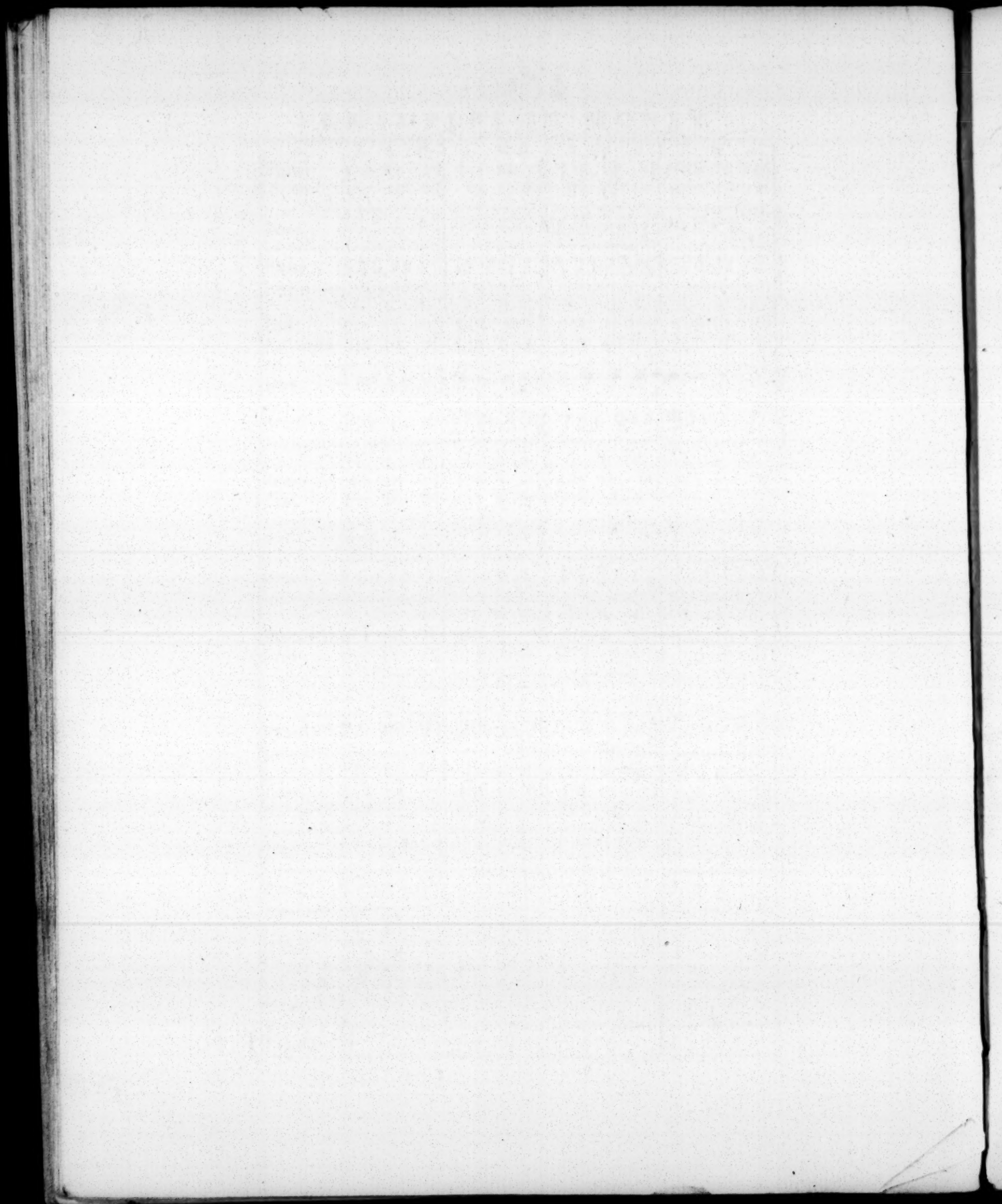
TEACHETH to take a LESSER Number from a GREATER, and thereby to find the REMAINDER or Difference. *The RULE is.* Place Numbers of the same Name under one another; Then observe that whatsoever Number was *lost* at in Addition, the same must be *borrowed* when Need requires in Subtraction; remembering to carry One to the next Place towards the Left-Hand. *The PROOF is.* Adding the Difference to the *lesser* Number gives the *greater*.

EXAMPLES.

	Pounds	Apples	Beans	Counters
From	762314	513721	324681	421721
Take	371212	357147	175340	234317
Rem.	391102	156574	149341	187404
	762314	513721	324681	421721
Proof				
	Marbles	Sheep	Oxen	Horses
From	523812	821346	792134	823192
Take	374703	311032	593126	312152
Rem.	149109	510314	199008	511040
	523812	821346	792134	823192
Proof				
	Soldiers	Miles	Years	Acres
From	735212	671328	431572	723154
Take	673218	282029	142907	536213
Rem.	61999	389299	288665	186941
	735212	671328	431572	723154
Proof				
	Men	Women	Children	Gallons
From	623713	573215	320131	601032
Take	471012	275154	207140	540410
Rem.	152701	291801	112991	660622
	623713	573215	320131	601032
Proof				

EXAMPLES IN MONEY.

	l. s. d.	l. s. d.	l. s. d.	l. s. d.
From	376 11 8 $\frac{1}{4}$	521 12 7 $\frac{1}{2}$	371 13 5 $\frac{1}{2}$	1522 11 10 $\frac{1}{2}$
Take	137 9 6 $\frac{1}{4}$	54 17 8 $\frac{1}{2}$	92 15 4	639 17 11
Rem.	239 2 1 $\frac{3}{4}$	521 12 7 $\frac{1}{2}$	278 18 1 $\frac{1}{2}$	882 13 11 $\frac{1}{2}$
Proof	376 11 8 $\frac{1}{4}$	54 17 8 $\frac{1}{2}$	371 13 5 $\frac{1}{2}$	522 11 10 $\frac{1}{2}$
	l. s. d.	l. s. d.	l. s. d.	l. s. d.
Lent	521 11 10 $\frac{1}{4}$	342 8 7 $\frac{1}{2}$	721 9 10 $\frac{1}{2}$	320 11 6 $\frac{1}{4}$
Received	242 12 7 $\frac{1}{2}$	237 6 4 $\frac{1}{2}$	652 5 1 $\frac{3}{4}$	248 10 4 $\frac{1}{2}$
Due	278 19 3 $\frac{1}{4}$	105 2 3 $\frac{1}{4}$	69 4 8 $\frac{1}{4}$	70 7 2 $\frac{1}{4}$
Proof	521 11 10 $\frac{1}{4}$	342 8 7 $\frac{1}{2}$	721 9 10 $\frac{1}{2}$	320 11 6 $\frac{1}{4}$
	l. s. d.	l. s. d.	l. s. d.	l. s. d.
Borrow'd	761 10 7 $\frac{1}{2}$	571 8 3 $\frac{1}{4}$	385 11 8 $\frac{1}{2}$	712 17 2 $\frac{1}{4}$
Paid	527 11 8 $\frac{1}{4}$	157 4 2	239 13 6	197 15 4
Refts	233 8 8 $\frac{1}{2}$	414 4 1 $\frac{1}{4}$	145 18 1 $\frac{1}{2}$	515 1 9
Proof	761 10 7 $\frac{1}{2}$	571 8 3 $\frac{1}{4}$	385 11 8 $\frac{1}{2}$	712 17 2 $\frac{1}{4}$
	l. s. d.	l. s. d.	l. s. d.	l. s. d.
Borrow'd	471 10 7 $\frac{1}{2}$	382 11 7 $\frac{1}{2}$	752 9 10 $\frac{1}{2}$	542 13 6
Paid	319 11 8 $\frac{3}{4}$	159 12 8	278 4 11 $\frac{1}{4}$	39 17 8
Refts	151 18 10 $\frac{1}{2}$	222 18 11 $\frac{1}{2}$	474 4 11 $\frac{1}{4}$	502 15 10
Proof	471 10 7 $\frac{1}{2}$	382 11 7 $\frac{1}{2}$	752 9 10 $\frac{1}{2}$	542 13 6
	l. s. d.	l. s. d.	l. s. d.	l. s. d.
Lent	372 14 8 $\frac{1}{4}$	452 11 6 $\frac{1}{4}$	372 10 7 $\frac{1}{2}$	742 8 6 $\frac{1}{4}$
Received	196 15 10 $\frac{1}{2}$	374 14 3	181 18 6	273 4 7
Due	175 18 9 $\frac{1}{2}$	77 17 2	290 12 0	469 3 11 $\frac{1}{4}$
Proof	372 14 8 $\frac{1}{4}$	452 11 6 $\frac{1}{4}$	372 10 7 $\frac{1}{2}$	742 8 6 $\frac{1}{4}$
	l. s. d.	l. s. d.	l. s. d.	l. s. d.
From	682 12 6 $\frac{1}{2}$	371 18 1 $\frac{1}{2}$	426 15 0 $\frac{1}{2}$	152 11 0 $\frac{1}{4}$
Take	287 15 11 $\frac{1}{4}$	485 15 8	274 18	69 10
Rem.	394 16 7 $\frac{1}{4}$	186 12 5	151 17	83 1
Proof	682 12 6 $\frac{1}{2}$	371 18 1 $\frac{1}{2}$	426 15	152 11



EXAMPLES in *Weights and Measures.*

Troy Weight				Apothecaries Weight			
lb	oz	dwt	gr	lb	3	3	3
732	7	14	12	421	10	13	11
276	11	15	21	73			
Avoirdupois Weight				Wire Measure			
Tons	qrs	lb	St.	lb.	oz.	dr.	lb.
512	12	1	17	724	11	2	13
374	16	2	18	75			
Wool Weight				Dry Measure			
Laits	S.	W.	St.	Laits	qrs.	B.	P.
452	9	1	10	542	9	1	7
231	10	1	11	74			
Beer and Ale Measure				Land Measure			
Butts	B.	K.	F.	Acres	R.	P.	Acres
862	1	0	1	5412	1	28	2172
173	0	1	0	73			542
Long Measure				Time			
Deg.	M.	F.	Yds.	Years	W.	D.	H.
842	13	5	41	742	41	3	21
179	47	6	73	79			
Cloth Measure				Time			
Ells	qrs.	N.	Yards	Years	W.	D.	H.
5312	2	2	7531	1	2		
1743	3	3	621				

QUEST. I. 'Tis now 5690 Years since the Creation. Noab's Flood happen'd 2656 Years after. Abraham's Call 2023. Moses, Job, and Cecrops, 2394. Jephtha's Rash Vow, Boaz, Ruth, and the Destruction of Troy, 2766. David, and Brutus first King of Britain, Homer, and perhaps Hesiod, 2912. The Prophet Micah, and Rome built by Romulus, 3196. Daniel thrown to the Lions, Cyrus, Solon, Cræsus, Pythagoras, Æsop, Anacreon, Simonides, and Pindar, 3394. Haggai, Zechariah, and Malachi, Prophets, Socrates, Plato, Xenophon, Themistocles, Sophocles, Euripides, and Herodotus, 3531. Alexander the Great, Aristotle, Diogenes, and Euclid, 3616. Julius Cæsar Dictator, and soon after, Virgil, Horace, Livy, Ovid, &c. 3902. Our Lord Christ born, 3948. Q. How many Years is it ago since all these particular Occurrences? And, How many Years before the Birth of Christ?

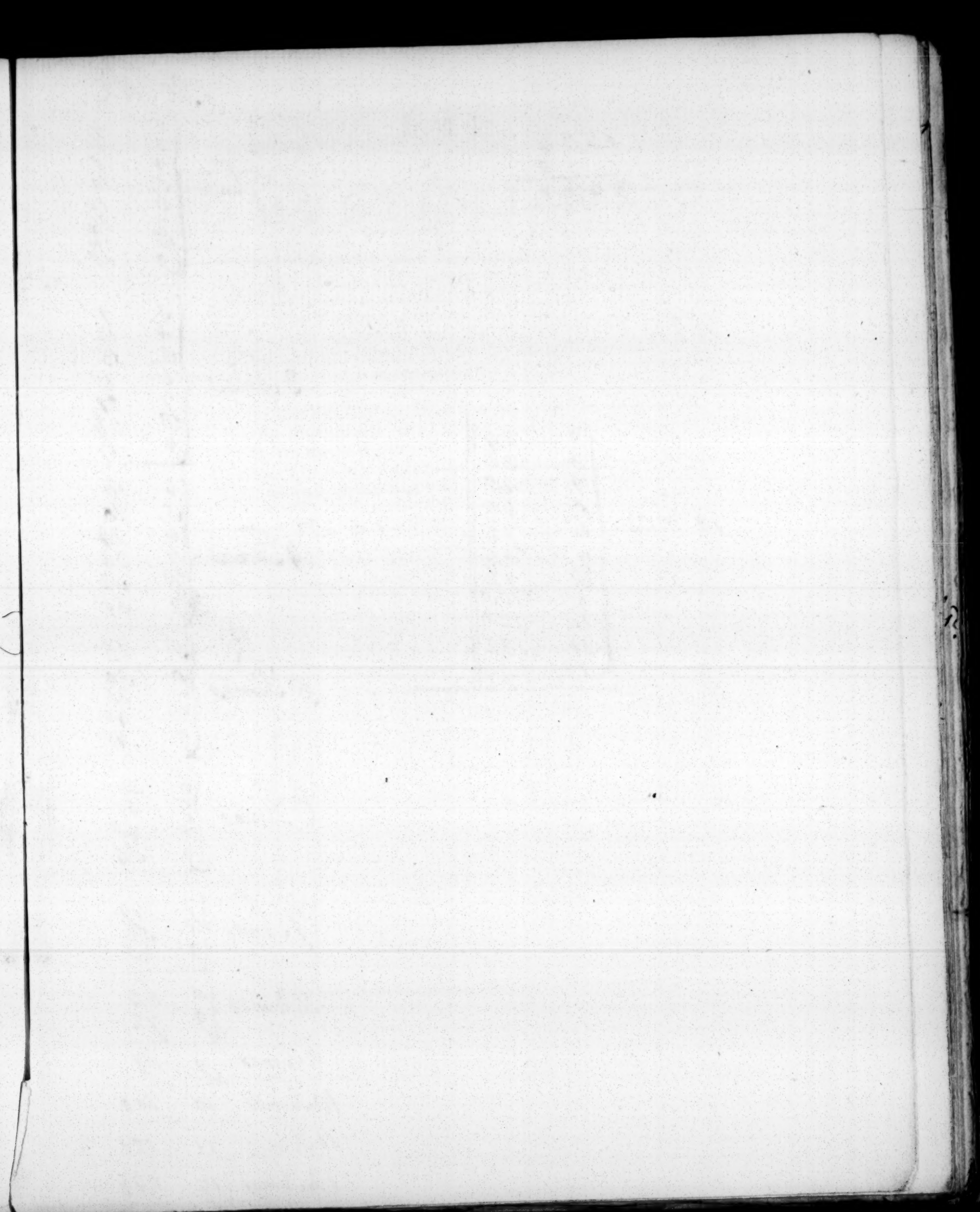
N. Subtracting the Particulars from 5690 tells how many Years ago. And Subtracting them from 3948 tells how many Years before Christ.

QUEST. II. 'Tis now 1742 Years since the Birth of Christ. Jerusalem was destroy'd by Vespasian, A. D. 73. Juvenal, Suetonius, Plutarch, Tacitus, and Quintilian, lived in 90, in which Year the Romans quite subdued Britain. The Saxons seized it in 449. The Danes in 1017. The Normans in 1066. Ireland was reduced to England by Henry the Second in 1177. Edward the First conquered Wales in 1283, and Scotland in 1296. The Compass was invented in 1302. Edward the Third first made Use of Cannon, and conquered France in 1346. Printing was brought into England by William Caxton in 1471. America was discovered by Columbus in 1492. The Reformation was confirmed in 1547. The Spanish invincible Armado beat in 1588. Powder-Plot defeated in 1605. Bible new translated in 1611. King Charles beheaded, 1648. The Restoration, 1660. The Fire of London, 1666. The Revolution, 1688. And England's Union with Scotland in 1706. Q. How many Years ago is it since all these particular Facts? And in what Year of the World did they happen, it being now Anno Mundi 5690?

N. Subtracting the Particulars from 1742 tells how many Years ago. And Subtracting 1742 from 5690, and adding the Particulars, gives the Year of the World.

MORE EXAMPLES in SUBTRACTION, if required.

Borrowed 641 l. 13 s. 6 d. $\frac{1}{2}$. Paid 287 l. 15 s. 9 d. $\frac{3}{4}$. — Lent 542 l. 12 s. 3 d. $\frac{1}{2}$. Received back 374 l. 19 s. 8 d. $\frac{1}{2}$. — From 824 l. 7 oz. 12 dwts. 11 gr. Take 547 lb. 9 oz. 14 dwts. 16 gr. — From 324 hund. 2 qrs. 13 lb. 13 oz. 11 dr. Take 146 hund. 3 qrs. 14 lb. 15 oz. 12 dr. — From 236 Tuns, 1 Pipe, 1 Hoghead, 23 Gallons, Take 148 Tuns, 1 Pipe, 0 Hoghead, 39 Gallons. — From 248 Lafts, 5 Quarters, 3 Bushels, 2 Pecks, Take 179 Lafts, 7 Quarters, 6 Bushels, 3 Pecks.



$$\begin{array}{r} 1534 \\ 2 \\ \hline 3068 \end{array}$$

12 Times	2	—	24
	3	—	36
	4	—	48
	5	—	60
	6	—	72
	7	—	84
	8	—	96
	9	—	108
	10	—	120
	11	—	132
	12	—	144

The Table.

Twice	2	4
	3	6
	4	8
	5	10
	6	12
	7	14
	8	16
	9	18

3 Times	3	9
	4	12
	5	15
	6	18
	7	21
	8	24
	9	27

4 Times	4	16
	5	20
	6	24
	7	28
	8	32
	9	36

5 Times	5	25
	6	30
	7	35
	8	40
	9	45

6 Times	6	36
	7	42
	8	48
	9	54

7 Times	7	49
	8	56
	9	63

8 Times	8	64
	9	72

9 Times	9	81
---------	---	----

10 Times	10	100
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11 Times	11	121
----------	----	-----

12 Times	12	144
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MULTIPLICATION

TEACHES from *two* Numbers given to find out a *third*, which shall contain either of the Numbers given, as many Times as the other contains Units.

The Numbers given are the MULTIPLICAND, or *Number to be multiplied*; and the MULTIPLIER, or *Number to multiply by*. Which *two* being multiplied into each other make up the *third* Number called the PRODUCT, or *Total Sum produced*.

The PROOF is. The *Product* divided by the *Multiplier* gives the *Multiplicand*. Or. The *Product* divided by the *Multiplicand* gives the *Multiplier*.

The whole Performance of which, and all succeeding Rules, depends on learning very perfectly by Heart the following —

MULTIPLICATION TABLE.

1	2	3	4	5	6	7	8	9	10	11	12
2	4	6	8	10	12	14	16	18	20	22	24
3		9	12	15	18	21	24	27	30	33	36
4			16	20	24	28	32	36	40	44	48
5				25	30	35	40	45	50	55	60
6					36	42	48	54	60	66	72
7						49	56	63	70	77	84
8							64	72	80	88	96
9								81	90	99	108
10									100	110	120
11										121	132
12											144

EXAM-

EXAMPLES. Multiply 987654321 by 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12. — Multiply likewise 123456789 by 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12.

Multiply 123456789 by 23, 432, 2345, 54321, 123456, 7654321, 12345678, 987654321. — Multiply also 987654321 by 23, 432, 2345, 54321, 123456, 7654321, 12345678, 987654321.

Observe, All these 38 Sums are to be performed and inserted by the Learner into the *Clean Paper* bound up with this *Cyphering Book*. Then he is to proceed to —

EXAMPLES of CONTRACTIONS in Multiplication.

Note 1. In *Multiplying*, when you come to any *Cypher* in the *Multiplier*, set it down exactly under it, and begin the *Multiplicand* again with the next Figure, and go thro' it in the same Line.

Multiply 765432 by 503, 72602, and 406502.

Note 2. When in the *Multiplier* you have *Cyphers* to the Right-Hand, set 'em on the Right-Hand of the *Product*, and multiply only by the significant Figures, thus —

Multiply 345678 by 10, 100, 1000, 20, 340, and 45600.

Note 3. When you have *Cyphers* at the End of both *Multiplicand* and *Multiplier*, multiply only by the significant Figures, and annex the *Cyphers* at last, thus —

Multiply 47600 by 230, 12000, 3400, and 567000.

QUEST. 1. How many Square Feet are there in a Room 132 Feet long, and 64 Feet broad?

QUEST. 2. How many Pantiles will it take to tile a Barn, if one Side must have 486 in Length, and 87 in Breadth?

$$\begin{array}{r} \text{Multiply } 2345 \\ \text{by } 4 \\ \hline \text{Product } 9380 \end{array}$$

$$\begin{array}{r} \text{Multiply } 37565 \\ \text{by } 5 \\ \hline 187825 \end{array}$$

$$\begin{array}{r} \text{Multiply } 35124 \\ \text{by } 24 \\ \hline 130496 \\ 70248 \\ \hline 832976 \end{array}$$

$$\begin{array}{r} \text{Multiply } 37215 \\ \text{by } 312 \\ \hline 67820 \\ 37215 \\ \hline 111645 \end{array}$$

90 days

$$\begin{array}{r} \text{Multiply } 47521 \\ \text{by } 76 \\ \hline 253126 \\ 332647 \\ \hline 832976 \end{array}$$

In £ how many Shillings?

$$\begin{array}{r} 20 \\ \hline \text{Shil } 3140 \end{array}$$

In £ how many Farthings?

$$\begin{array}{r} 4 \\ \hline 496324 \\ \hline 1985296 \text{ Farthings} \end{array}$$

In 58752 Shillings how many Pence?

$$\begin{array}{r} 12 \\ \hline 58752 \\ \hline 117504 \\ 58752 \\ \hline \text{Pence } 705024 \end{array}$$

To bring { Pound into Shillings } multiply by { 20 }
 { Shillings into Pence } { 12 }
 { Pence into Farthings } { 4 }

In 157 how many Sh. Pence
 20
 3140
 12

Pence 3768 4

Farthings 150720

To bring { Tuns into Hund.^d } multiply by { 20 }
 { Hund.^d into Quarters } { 4 }
 { Quarters into lb } { 28 }
 { Pound into Ounces } { 16 }
 { Ounces into Drams } { 16 }

In 13 how many C. 2ⁿ
 20
 260
 4

To bring { years into Days } multiply by { 365 }
 { Days into Hours } { 24 }
 { Hours into Minutes } { 60 }
 { Minutes into Seconds } { 60 }

Hund^d 260
 4

Quarters 1040
 28

8320
 16640
 Pounds 174720
 16

1048320
 174720

Ounces 2795520

In 15 years how many Days - Hours - and Minutes - Seconds

365
 15
 1825
 365
 5475
 24
 21900
 10940
 131300
 60
 7878000
 60
 475680000
 60
 Days
 hours
 Minutes
 Seconds

In 25600 miles how many Yards, Feet, Inches
and Barley Corns?

$$\begin{array}{r}
 25600 \\
 1760 \\
 \hline
 1536000 \\
 179200 \\
 25600 \\
 \hline
 45056000 \text{ Yards} \\
 135168000 \text{ Feet} \\
 270836000 \\
 135168000 \\
 \hline
 1622016000 \text{ Inches} \\
 4866048000 \text{ Barley Corns}
 \end{array}$$

In 17 Mls of Holland how many 2nd and Nails?

$$\begin{array}{r}
 15 \\
 85 \\
 4 \\
 \hline
 340 \text{ Nails}
 \end{array}$$

In 174679 Farthings how many D S £?

4) 174679 (43669 Pence

$$\begin{array}{r}
 16 \\
 \hline
 14 \\
 \hline
 26 \\
 24 \\
 \hline
 27 \\
 24 \\
 \hline
 39 \\
 36 \\
 \hline
 3
 \end{array}$$

12) 43669 (3639 Shillings

$$\begin{array}{r}
 36 \\
 \hline
 76 \\
 72 \\
 \hline
 46 \\
 36 \\
 \hline
 109 \\
 108 \\
 \hline
 1
 \end{array}$$

20) 3639 (181 Pounds

$$\begin{array}{r}
 20 \\
 \hline
 168 \\
 160 \\
 \hline
 39 \\
 20 \\
 \hline
 19
 \end{array}$$

Answer 43669 Pence

3639 Shillings 181 Pounds.

Or £ 181 - 19 - 1 $\frac{3}{4}$

In 7 Miles how many feet Inches Barley corns

1760

12320 Yards

36960 feet

443520 Inches

1330560 Barley corns

Answer 36960 feet 443520 Inches 1330560 Barley corns

In 380160 y^d how many miles & Leagues

Answer 216 miles 72 Leagues

2nd

In 120 how many bu. pk^{bu} gal qto

Answer, 960, " 3840 7680 30720 qto

30720 of corn how many q^{rs}

Answer 120 q^{rs}

3rd

17 $\frac{3}{4}$ of Superfine Cloth at 1 " 3 " 6 per y^d

8 x 2 = 16

9	8	0 ₂
18	16	4
1	3	6
"	17	7 $\frac{1}{2}$
20	17	1

L S D

Answer 20 " 17 " 1 $\frac{1}{2}$

$$\begin{array}{r} \text{H} 1 \text{ } \overset{\text{D}}{\text{---}} \text{ } \overset{\text{D}}{\text{---}} \text{ } \overset{\text{D}}{\text{---}} \\ 12 \end{array}$$

$$\begin{array}{r} 108 \\ 115 \\ 37 \end{array}$$

Answer L 0 D
17 " 14 " 7

$$\begin{array}{r} 805 \\ 345 \\ 12 \overline{) 4255} \end{array}$$

$$\begin{array}{r} 36 \\ 65 \\ 60 \\ 55. \\ 48 \\ 7 \end{array}$$

L S D

$$12 \overline{) 257 \text{ " } 2 \text{ " } 5} \quad 1$$

$$\begin{array}{r} 5142 \\ 12 \overline{) 61709} \end{array} \quad (5142$$

$$\begin{array}{r} 17 \\ 12 \overline{) 50} \\ 48 \\ \hline 209 \\ 24 \\ \hline 5 \end{array}$$

$$\begin{array}{r} 12 \overline{) 5142} \quad (428 \\ 48 \\ \hline 34 \\ 24 \\ \hline 102 \\ 96 \\ \hline 6 \end{array}$$

$$20 \overline{) 428} \quad (21$$

$$\begin{array}{r} 28 \\ 20 \\ \hline 8 \end{array}$$

L S D
Answer $21 - 8 = 6$

If 2nd of Cloth cost 5/ what will 30 Yards

$$\text{If } 2 \text{ " } \overline{) 5} \text{ " } 30$$

$$\begin{array}{r} 2 \overline{) 150} \quad (75 \\ 14 \\ \hline 10 \\ 10 \\ \hline 0 \end{array}$$

L S
Answer 3 " 15

If 1 Yard cost $1^s 3^d$ what will $75\frac{1}{2}$ Yards

$$\begin{array}{r} 20 \overline{) 23} \text{ (4)} \\ 80 \\ \hline 120 \end{array}$$

$$\begin{array}{r} 15 \\ \hline 375 \\ 75 \\ \hline 12 \overline{) 1125} \text{ (93)} \\ 108 \\ \hline 45 \\ 36 \\ \hline 9 \end{array}$$

Answer $4^s 21^d 4\frac{1}{2}$

9

If 1 Yard cost $4^s 3^d$ what will 19 Yards cost

$$\begin{array}{r} 12 \\ \hline 51 \\ 19 \\ \hline 459 \\ 55 \end{array}$$

half Yard $2^s 3^d$

$$\begin{array}{r} 12 \overline{) 969} \text{ (80) shil} \\ 96 \\ \hline \end{array}$$

Answer $4^s 2^d 3$

If one Yard cost $12^s 4^d$ what 37

$$\begin{array}{r} 148 \\ 37 \\ \hline 1036 \\ 444 \\ \hline 12 \overline{) 5476} \text{ (456)} \\ 48 \\ \hline 67 \\ 60 \\ \hline 76 \\ 72 \end{array}$$

$$\begin{array}{r} 12 \overline{) 448} \\ 37 \\ \hline 444 \\ 48 \\ \hline 76 \\ 72 \end{array}$$

Answer $23^s 2^d 6$

1/10 1880

1/10 1880

1/10 1880

1/10 1880

1/10 1880

1/10 1880



D I V I S I O N

TEACHES to find *how often* one Number is contained in another, and 'tis comprehended under four *Terms*, namely —

- The **DIVIDEND**, or *Number to be divided*.
- The **DIVISOR**, or *Number to divide by*.
- The **QUOTIENT**, which shews (*quoties*) how often the *Divisor* is contained in the *Dividend*. And —
- The **REMAINDER**, if any; which must be always less than the *Divisor*. — The **RULE** is —

SEEK, MULTIPLY, SUBTRACT—Bring **DOWN**.

*First ask how oft? In Quotient Answer make;
Then Multiply, Subtract, next Figure take.*

The **PROOF** is. Multiplying the *Quotient* by the *Divisor*, and Adding the *Remainder*, gives the *Dividend*. Or. The *Dividend* divided by the *Quotient* gives the *Divisor*.

E X A M P L E S.

Divide 123456789 by 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12. —
Divide also 987654321 by 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12.

Observe here, The Master is to shew the Learner how to divide these foregoing Sums the **SHORT WAY**, by setting the *Divisor* under the *Dividend*, then drawing a Line underneath, and placing the *Quotient* under it. But in the following where the *Divisor* exceeds 12, it is to be set on the Left-Hand of the *Dividend*, and the *Quotient* on the Right, with two crooked Lines between. —

Divide 9876543212345 by 23, 432, 2345, 54321, 123456, 7654321, 12345678, 987654321.

Divide likewise 1234567898765 by 23, 432, 2345, 54321, 123456, 7654321, 12345678, 987654321.

EXAMPLES of CONTRACTIONS in *Division*.

Note. If there are any *Cyphers* on the Right-Hand of the *Divisor*, cut 'em off with a Line, and also cut as many Figures off in the *Dividend*, and divide with the Remaining Figures; but remember to bring the Figures cut off in the *Dividend* down to the *Remainder*, as in the following Examples.

Divide 987654321 by 10, 100, 20, 200, 3400, 45600, 560700, 6078000, and 78908000.

QUEST.

QUEST. 1. A Merchant dying left 45632 Pounds to be equally divided among 64 Persons, I demand each Man's Share?
Answer, 713 l.

QUEST. 2. If the Emperor of *China's* Revenues amount to 776541150 Pounds Sterling *per Annum*, What is his Daily Income? — That is, Divide 776541150 by 365 the Days in a Year.
Answer, 2127510 l.

QUEST. 3. If the Annual Income of *France* be 83999640 *l.* of *England* 43999655 *l.* and of *Holland* 16999875 *l.* What is their Daily Income?

N.B. There are several Ways of *Working* DIVISION ; such as the *Spanish* and *Portuguese* Methods, both which are by the Scratch ; and the *short Italian* Method, which is by a private Subtraction ; all which the Master, if curious, may teach his apt Scholars : But the Method I in general teach and propose is the *long Italian*.

The further Improvement of *Multiplication* and *Division* is referred to REDUCTION.

THE END OF PART I.



Examples in Division

Divide 34564 by 3!

$$\begin{array}{r}
 \text{Dividend.} \\
 \text{Divisor } 3 \overline{) 456.4} \quad 152.1 \text{ Quotient} \\
 \underline{3} \\
 \underline{15} \\
 \underline{15} \\
 \underline{06} \\
 \underline{6} \\
 \underline{04} \\
 \underline{3} \\
 \underline{1} \text{ Remainder.}
 \end{array}$$

Suppose 2759 Pounds were to be distributed
among 6 Men, how is each to have?

$$\begin{array}{r} 6 \overline{) 2759} (4592 \\ \underline{24} \\ 35 \\ \underline{30} \\ 59 \\ \underline{54} \\ 50 \\ \underline{48} \\ 20 \\ \underline{18} \\ 20 \\ \underline{18} \\ 20 \\ \underline{18} \\ 20 \end{array}$$

Answer 459. 16. 0.

How many Times will a Coach Wheel turn round
between Worcester & London Supposing the Wheel
5 Yards in Circumference & the distance 111 Miles

$$\begin{array}{r}
 1760 \\
 111 \\
 \hline
 1760 \\
 1760 \\
 1760 \\
 \hline
 5 \overline{) 195360} \quad (39072 \text{ Number of turns.} \\
 \underline{75} \\
 45 \\
 \underline{45} \\
 036 \\
 \underline{35} \\
 10 \\
 \underline{10} \\
 0
 \end{array}$$

Q In 5756 Pounds how many Pounds?

$$\begin{array}{r}
 5756 \text{ Pounds} \\
 20 \overline{) 28780} \quad (1439 \\
 \underline{20} \\
 87 \\
 \underline{80} \\
 78 \\
 \underline{60} \\
 180 \\
 \underline{180} \\
 0
 \end{array}$$

In 15769 Gallons of Port Wine how many
Hogsheads?

$$\begin{array}{r} 63 \overline{) 15769} \quad (250 \text{ Hogsheads} \\ \underline{126} \\ 316 \\ \underline{315} \\ 19 \text{ Gallons over.} \end{array}$$

In 57694 Feet how many Yards & Miles?

$$3 \overline{) 57694} \quad (19231$$

$$\begin{array}{r} 3 \\ \underline{27} \\ 27 \\ \underline{27} \\ 06 \\ 6 \\ \underline{6} \\ 09 \\ 9 \\ \underline{9} \\ 04 \\ 3 \\ \underline{3} \\ 1 \end{array}$$

$$\begin{array}{r} 1760 \overline{) 19231} \quad (10 \\ \underline{176} \\ 1631 \end{array}$$

Answer 10 Miles & 1631
Yards over

© In 175769 Gallons of Port Wine how many Hogheads?

63) 175769 (A Merchant dying left
123 45632 to be equally divided
among 64 Persons I demand each
mans share
527
504

236
189

479
441

38

64) 45632 (1713
448

83

64

192

192

Answer 1713

© 4757 Nobles

how many Shillings & Pounds?

a noble is 6s

12) 380560 (31713 Shill

20
12

85

84

16

12

40

36

(4)

20) 31713 (1005

171

160

113

100

(13)

There was a certain Number of Men concerned in
the Payment of 1272 £ and each Man paid
3 £ I demand the Number of Men?

$$\begin{array}{r} 3 \overline{) 1272} \quad (424 \\ \underline{12} \\ 07 \\ \underline{6} \\ 12 \\ \underline{12} \\ 0 \end{array} \quad \begin{array}{r} 3 \text{ Proof} \\ \underline{1272} \end{array}$$

Suppose A Gentleman has a Mind to make a Tour
round the Globes which is about 25600 Miles,
how long will he be performing it supposing he will
travel 30 Miles a Day?

$$\begin{array}{r} 30 \overline{) 25600} \quad (853 \text{ days} \\ \underline{240} \\ 160 \\ \underline{150} \\ 100 \\ \underline{90} \\ 10 \end{array}$$

or two Years 17 weeks &
4 days over

66; 14.

Four Men brought each $\text{£} 17..10$ value in Gold into the Mint to be coin'd into Guineas how many must they have?

$$\begin{array}{r}
 \text{£} \quad \text{v} \\
 17..10 \\
 \underline{20} \\
 350 \\
 \underline{4} \\
 21 \overline{) 1400} \quad 66 \\
 \underline{126} \\
 140 \\
 \underline{126} \\
 14
 \end{array}$$

* Answer $\text{£} 66..14..00$ in all.

Q. The Circumference of the Earth are 2600 Geographical or computed Miles 60 of which made one Degree; how many Degrees $\frac{1}{2}$ of Earth round?

(88£)

A certain Tenant was behind with his Landlord
for 16 years Rent at 5 £ 10^s per year how much
was the whole Debt?

$$\begin{array}{r} \text{£ } 5 \text{ } 10 \\ 20 \\ \hline 110 \text{ Shillings} \\ 16 \text{ years.} \\ \hline 660 \\ 110 \\ \hline 1760 \end{array} \begin{array}{l} \\ \\ 88 \end{array}$$
$$\begin{array}{r} 160 \\ 160 \\ \hline 0 \end{array}$$

Answer 88. which is
the sum, the Tenant
owes.

The Rule of Three,

Call'd sometimes the Golden Rule for its Excellences,
Teaches, by having Three Numbers given, to find
out a Fourth, which shall bear the same
Proportion to the third as the second does to
the first.

Rule

If the fourth Number should be more than the second,
multiply the second Number the greater of Two Extremes
& divide the Product by the less, and the Quotient
is the Answer.

But, if the fourth Number should be less than
the second, multiply the second Number by the
Less of the two Extremes, and divide the Product
by the greater and the Quotient is the Answer

If 2 yards of Holland cost 8 Shillings what will
147 yards cost at that Rate?

If 2 — 8 — 147

$$\begin{array}{r} 8 \\ 2 \overline{) 1176} \quad (588 \\ \underline{10} \\ 17 \\ \underline{16} \\ 16 \end{array} \quad \begin{array}{l} 588 \\ 29 = 8 = 0 \end{array}$$

Answer 29. s. 8. d.

If 10 yards of Damask cost 50 Shillings what is
one yard worth at that rate?

$$\begin{array}{r} 10 - 50 - 1 \\ 10 \overline{) 50} \quad (5 \\ \underline{50} \end{array}$$

Answer 5 Shilling one Yard

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It 2 — 8 — 147

$$\begin{array}{r} 2 \overline{) 1176} \begin{array}{l} 588 \\ 29 \end{array} \\ \underline{10} \\ 17 \\ \underline{16} \\ 16 \end{array}$$

Answer 29. Shillings.

If 10 yards of Damask cost 50 Shillings what is
one yard worth at that rate?

$$\begin{array}{r} 10 - 50 - 1 \\ 10 \overline{) 50} \begin{array}{l} 5 \\ 50 \end{array} \end{array}$$

Answer 5 Shilling one Yard

B. & D.

If 120 Yards of cloth cost 6. 10. 4 what will
one yard cost?

$$\begin{array}{r}
 \text{£ } 120 \quad \text{L. 10. 4} \quad \text{Y. 1} \\
 \hline
 20 \\
 \hline
 130 \\
 12 \\
 \hline
 264 \\
 130 \\
 \hline
 1564 \\
 120 \overline{) 7564} \quad (13 \text{ pence} \\
 \hline
 120 \\
 \hline
 364 \\
 360 \\
 \hline
 4
 \end{array}$$

Answer 1. 1. 4 pence,

If 1 Yard of Damask cost 8^s what will 12 Ells

	^{y^d}	^{sh}	^{Ells.}
If 1	—	8	— 12
4	—	8	— 60

4) 480 (120 Shillings
 4
 8
 0

or 6. Pound.

If 12 Ells cost 6^s, what will 1 yard cost?

[£]	^{sh}	^y
12	— 6	— 1
<u>5</u>	<u>20</u>	<u>4</u>
60	— 120	— 4

60) 480 (8 Shillings
 480
 0

To find a number which any One
shall think on.

Let a Person think on any number
Double it.

Multiply y^e Double by 5

Then let the Person give you the Product.

From which drop y^e Last Figure & y^e other
will be the Number first thought on.

If 3 ^{lb} of Sugar cost 2. 4 what will a Loaf w.^h
weighs 40 ^{lb} cost?

^{lb} 3 28 — 40
28

3) $\begin{array}{r} 320 \\ 80 \\ \hline 1120 \end{array}$ (372
9
22
21
10
66
4

Shillings
12) 372 (31
36
12
12
0

Answer 1. 11: 0



Someany Pound^s —
Someany $\frac{1}{2}$ Pound^s —
Someany Groats —
Someany Pence —

What comes o^d a Day to for a Year.

4
4
4
4
4